THE IRON TRADE REVIEW

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National War Savings Committee, Washington

W.S.S.
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This space contributed for the Winning of the War by
COLUMBIA STEEL & SHAFTING CO., of Pittsburgh, Pa.

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H. KOPPERS COMPANY

Builders of

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Ammonia Stills

CONSULTING ENGINEERS

on the operation of

By-Product Coke Plants and Auxiliaries

UNION ARCADE BUILDING
PITTSBURGH, PA.

Say you saw it in THE IRON TRADE REVIEW

THE IRON TRADE REVIEW

Vol. LXII Cleveland, May 23, 1918 *No. 21*

Government Planning Many Works

Will Join in Large Extensions of By-Product Coke Capacity—Will Support New Blast Furnace Construction—Second Ordnance Works and Fabricating Plant Assured—Official Prices Revised

GREAT government war enterprises of an iron and steel character continue to develop. A large program of construction in by-product coke plants under government financial auspices is to be launched. Expectations are that 1500 additional ovens will be built at different locations. These will serve the double purpose of augmenting the supply of high explosives for military needs and of fortifying the weak spots in the coke situation against winter uncertainties. The new ovens are expected to be in service as soon as possible. Blast furnace extensions figure in these plans. A start along this line already is being made in the Wheeling district. Two new furnaces at St. Louis are being considered. Ordnance officers have notified machine tool builders to be prepared to equip a second great gun plant to be established near Philadelphia for the government by the Midvale Steel & Ordnance Co. For this and the new Neville island ordnance works of the Steel corporation, $15,000,000 worth of heavy and small tools will be needed. Details of the Neville island plant are to be rapidly determined. Its finished output of large guns and projectiles will be 25,000 tons monthly. A steel plant is to be provided on this scale. Whether it will be duplex or straight open hearth is yet to be settled. The proposed government fabricating plant to furnish ship steel is expected to take form soon.

Big Orders Piling Up

These impressive undertakings to enlarge both raw material and finished capacities are being paralleled by further demands for steel for immediate war purposes. Chicago district mills have had an unusual week in bookings of this kind. About 200,000 tons of material covering a new Pacific order for 50 ships and 75,000 to 100,000 tons of shell bars have been entered there. Arrangements were made with lake shipyards to 130 additional craft by the end of 1919 season calling for over 200,000 tons of steel. The distribution of the 1,300,000 to 1,400,000 tons of rolled steel for the 100,000 cars is about to be made..

Government Shows Needs

The rapidity with which the government is piling up requirements before the mills and furnaces has made it imperative that producers know more explicitly just what is to be expected of them. The government at a meeting with the manufacturers in Washington last week acknowledged their right to more exact information of this character than hitherto has been given. A joint committee of producers and the war industries now is at work to assemble and consolidate these data relating to present and future war necessities. The result of this survey largely will settle the moot question whether there is to be any surplus of steel for commercial buyers and how much. Whether there is something for open market consumption as the majority view maintains, or not, a definite curtailment policy for nonwar industry and probably some form of licensed distribution promise now to come to a head.

Foundry War Work Light

Such partial data as have been collected by pig iron producers from their customers shows less proportion of foundry capacity on war work than had been believed previously. Gray iron and malleable plants have returned to date a showing of not over 50 to 60 per cent of war business on the average. Steelworks capacity is taken up to about 90 per cent by essential production. If the foundry percentage of war business holds good in the completed data, it would indicate there is perhaps 2,000,000 to 3,000,000 tons of annual consumptive capacity which is either to be filled by war orders or is to be deprived of iron in behalf of more necessary requirements.

Numerous revisions of differentials and extras on various iron and steel products have been put into effect by a voluminous announcement of the general committee of the American Iron and Steel institute.

MAY 23, 1918

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Machinery and Supply Manufacturers and Dealers in Concurrent Sessions of Four National Associations Deliberate War Problems and Emphasize Necessity for Subordinating Self-Interest in the Present Struggle.

Rivalry and Shipbuilding Records

PACIFIC coast shipyards, up until the present time, have been carrying off most of the shipbuilding honors. News columns have been filled with the exploits of the western yards. The first steel ship built under a direct government order was a Seattle product. The first wooden ship delivered complete to the government is undergoing her trials on the Pacific and the largest concrete ship ever built was constructed near San Francisco and has just completed a successful trial trip.

Records of actual ship construction recently made public by the shipping board reveal strikingly the class of work the western yards have been doing in comparison with those eastern yards which were free to take contracts from the shipping board. The Pacific coast division, for instance, during one recent week averaged nearly 30,000 rivets driven per way. The best the north Atlantic yards working on shipping board orders could do was about 9500 rivets per way, with the Great Lakes making a record of 9000 and the gulf and south Atlantic section ranking fourth with less than 4000.

Of the 25 ships built in the shortest time, 13 were built on the Pacific, eight on the Great Lakes and four on the Atlantic. Of these 13 western built ships, nine were built by one company, which in the same week showed an average rivet drive of 43,000 per way, the highest record set by any yard in the country.

The older, established yards in the east generally were filled with navy business when the shipping board began distributing its immense orders for ships. Records on naval construction, of course, are not being made public, so that until this class of business is completed, many of the yards which for years have figured most prominently in American shipbuilding activities will be unable to pick up the gage of competition thrown down by their new Pacific competitors. The recent record made by the New York Shipbuilding Corp. in constructing and fitting out complete an ocean-going steamer in 37 days, is indicative of the class of work which these eastern yards are prepared to handle after the requirements of the navy department have been met.

"Proclaimed championships produce team work," said Mr. Schwab recently, "first in the groups comprising the working force in each yard and finally in the yard itself." Healthy rivalry is growing between yards and groups of workmen and executives all over the country and the results are being shown in the speed with which the American merchant marine is growing.

Dismiss the Steel Suit

WAR has demolished more false ideas and standards of public and private life than years of the slow process of logic and education ever could have made possible. Business has felt this almost revolutionary movement toward basic truths and bare essentials and has modified some of its methods accordingly. Government likewise is purging itself of some of the virus of practical politics with its attendant vacillation and mere vote-catching tactics. The public with the increased stake of life and treasure in this conflict has not patience for inefficiency and nonperformance. Nor is it mindful of the bruised feelings of those who have been foisting on the country nostrums that stand revealed in their true light now that the welfare and safety of the nation are in jeopardy. Results are demanded, and these quickly. War is applying the absolute acid test.

The active partnership established by the government on its own initiative with the United States Steel Corp. for the construction and operation of a great ordnance plant in the Pittsburgh district is a sure sign of the changed times. It may appear incongruous that the government should have joined with—in fact, should have appealed for help—to a business organization which it has been trying for several years to put in the outlaw class. It need not be so regarded. The country needs the concentrated authority, resources and power of the Steel corporation in the present crisis. Every patriot well may

utter a thankful prayer that the country has a Steel corporation to enlist in its aid in this hour of greatest need. It is a manifestation of sound and capable counsel at Washington that the government is making full use of the country's industrial potentialities.

If this war means anything, it means the enthronement of efficiency and achievement. This is the true significance of the government's specific call upon the Steel corporation and its heavy dependence upon the whole steel industry. Organized business, the bigger the better, never was so welcome in this country as at the present time. The courts in dismissing the antitrust suit this week against the United Shoe Machinery Corp. held that it was poor public policy to dissolve an organization so highly efficient. The government constructively now has recognized the efficiency and value of the Steel corporation by summoning it to its aid. In these days, when hackneyed theories are being discarded for more elementary and genuine standards, the government has a singular opportunity to demonstrate that it is joining step with the new conditions of progress. To dismiss the Steel corporation suit now indefinitely suspended in the Supreme court, would be an act not only consistent with the circumstances, but significant of the formal recognition that new and practical bonds now unite government and business in this country.

Encouraging Ideas From Operatives

IMPROVEMENTS in machinery and methods of operation not only originate in the minds of executives, engineers and draftsmen, but often in the minds of employes much further down the line. Many operatives in iron and steel plants by reason of their close contact with the work and by the possession of inventive ability are in a better position to suggest changes in equipment and methods of operation or the addition of new machinery, special tools or other appliances, than those whose duty it is to oversee. Plenty of inventive ideas which would effect economy, if applied, are anchored in the minds of operatives; but on account of their minor positions in the organization, they are prone to keep these suggestions locked in their brains rather than to advance them and be ridiculed by other employes.

As a means of encouraging the practice among employes of making suggestions for plant improvement, not a few iron and steel companies every six months offer cash prizes ranging from $2 to $100 for the best suggestions. It is intended that the prizes shall go to those who have no other way of offering suggestions and no opportunity for testing their original ideas. Any employe, excepting superintendents, foremen, mechanical and electrical engineers, etc., may write suggestions which he thinks the company could use to advantage and place them in an envelope without any signature. A duplicate copy is retained by the man offering the suggestion. The envelope is then deposited in locked boxes which are installed in prominent places throughout the plant. Once a week the boxes are opened and their contents considered by judges, including superintendents and foremen. If any suggestion is found to be of sufficient value to warrant its use by the company, it is adopted immediately. After the suggestions are considered, they are numbered in the order of their value and posted where they may be seen by all concerned. The employe who receives an award presents to the judges the duplicate copy of his suggestion signed by himself and then is given the corresponding prize. No limit is placed on the number of original ideas that may be brought forth by any employe.

In too many cases ideas are considered of no value by the man who first thinks of them. He tries them on his co-workers and is told to throw them on the ash heap because they are too trifling. Discouragement of this nature should not be tolerated. What may seem trifling to some, especially a workman, may possess merit making it of much importance to a whole plant. A slight change in the detail of a machine or in the method of operation often produces results which are beneficial not only to the company, but to the workmen as well.

Daylight on Railroad Problem

GOVERNMENT control of railroads is bringing about a vastly changed attitude on the part of all concerned. It was welcomed by the railroads because them knew that intimate knowledge of conditions would lead the government to change its attitude toward transportation interests. The repressive tactics that kept income low while costs climbed had brought about an impossible condition, which probably will not recur once it is fully recognized by the government. The shipper also has come to see the futility of expecting service in keeping with his needs under a plan whereby income is not sufficient to look after betterments and maintenance. Probably the efforts of shippers to obtain reductions in rates will become less in the future as it is recognized that fair rates, though higher, will be cheaper in the long run through more efficient service and lessened delays in moving material.

Just what will result from the present experiment no one can foresee, but it is certain that one effect will be a better atmosphere and improved conditions in every respect.

No loss has been sustained in operating efficiency, as men of ability have been retained to manage the several properties. In other ways efficiency has been gained by cutting out competition and duplication, unnecessary hauls and a host of other evils which resulted from former repressive rules. Operating as a unit every road does its utmost and gets a better return. The nation thus is the gainer.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 1344

PIG IRON

Bessemer, valley	$35.20
Bessemer, Pittsburgh	36.15
Basic, Pittsburgh	32.95
Basic, eastern Pa.	32.00
Basic, Buffalo	32.00
Malleable, Pittsburgh	34.45
Malleable, Chicago	33.50
Malleable, Philadelphia	34.00 to 37.50
Malleable, Buffalo	33.50

GOVERNMENT SCHEDULE

1.75 to 2.25 silicon (No. 2 foundry, No. 2 plain, and No. 3 southern), $33 furnace base.

2.25 to 2.75 silicon (No. 2X, No. 1 Northern foundry, and No. 2 southern), base plus 50c.

2.75 to 3.25 silicon (No. 1X, No. 2, soft), base plus $1.50.

Over 3.25 silicon, $34.50, plus $1.00 for each ½ per cent of silicon.

No. 1X, Phila.	35.25 to 35.50
No. 2 foundry, Pittsburgh	33.95
No. 2 foundry, Cleveland	33.95
No. 2 foundry, Ironton	33.00
No. 1 foundry, Chicago	33.50
No. 2 foundry, Chicago	33.00
No. 2X foundry, Phila.	34.25 to 34.50
No. 2X foundry, N. J. tide	34.25 to 34.50
No. 2X foundry, Buffalo	33.50
No. 2 plain, Philadelphia	33.75 to 34.00
No. 2 plain, N. J. tide	33.75 to 34.00
No. 2 southern Birmingham	33.00 to 33.50
No. 2 southern, Cincinnati	36.40
No. 2 southern, Chicago	37.50
No. 2 southern, Phila. del.	38.30 to 39.40
No. 2 southern, Cleveland	37.50
No. 2 southern, Boston	39.50
No. 2 southern, St. Louis	35.90
Virginia, No. 2X, furnace	33.50
Virginia, No. 2X, Phila.	36.77
Virginia, No. 2X, Jersey City	37.02
Virginia, No. 2X, Boston	37.27
Gray forge, Pittsburgh	32.95
Silveries, 8 per cent, furnace	46.00
Silveries, 8 per cent, Chicago	48.54
Low phos. standard, Phila.	55.00 to 56.00
Low phos., Lebanon, furnace	50.00
Low phos., Pittsburgh	53.00
Charcoal, Superior, Chicago	37.50
Charcoal, Superior, Buffalo	39.75
Charcoal, southern furnace	43.00

COKE

(At the ovens)

Connellsville furnace	$6.00
Connellsville foundry	7.00
Pocahontas furnace	8.00
Pocahontas foundry	8.00
New River foundry	8.00
New River furnace	7.00
Wise county furnace	6.00
Wise county foundry	7.00

FERROALLOYS

Ferromanganese, 80 per cent delivered	$290.00
Ferromanganese, 70 per cent delivered	250.00
Spiegel, 16 per cent fur., spot	75.00 to 77.00
Spiegel, contracts, furnace	70.00
Ferrocarbon titanium, carloads, maker's plant	200.00
Ferrosilicon, 50 per cent, second quarter, Pitts.	155.00 to 160.00
Ferrosilicon, 50 per cent, Pitts., remainder of 1918	150.00
Bessemer ferrosilicon, 10 per cent.	55.00
Bessemer ferrosilicon, 11 per cent.	58.30
Bessemer ferrosilicon, 12 per cent.	61.60

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

SEMIFINISHED MATERIAL

BILLETS AND BLOOMS

Open-hearth, Pittsburgh	$47.50
Open-hearth, Philadelphia	50.50
Open-hearth, Youngstown	47.50
Bessemer, Pittsburgh	47.50
Bessemer, Youngstown	47.50
Forging, Pittsburgh	60.00
Forging, Philadelphia	63.00

SHEET BARS

Open-hearth, Pittsburgh	$51.00
Open-hearth, Youngstown	51.00
Bessemer, Pittsburgh	51.00
Bessemer, Youngstown	51.00

SLABS

Pittsburgh and Youngstown.	$50.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$57.00
Grooved skelp, Pittsburgh	2.90c
Sheared skelp, Pittsburgh	3.25c

SHAPES, PLATES AND BARS

(In cents per pound)

Structural shapes, Pitts.	3.00c
Structural shapes, Phila.	3.185c
Structural shapes, N. Y.	3.195c
Structural shapes, Chgo.	3.00c
Tank plates, Chicago	3.25c
Tank plates, Pittsburgh	3.25c
Tank plates, Philadelphia	3.435c
Tank plates, New York	3.445c
Bars, soft steel, Pittsburgh	2.90c
Bars, soft steel, Chicago	2.90c
Bars, soft steel, New York	3.095c
Bars, soft steel, Phila.	3.085c
Bar iron, Chicago	3.50c
Bar iron, Phila.	3.50c to 3.685c
Bar iron, Cleveland	3.64c to 3.70c
Bar iron, New York	3.50c to 3.695c
Bar iron, Pittsburgh	3.50c
Hard steel bars, Chicago	3.00c

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh base.	3.25c
Angle bars, Chicago base	3.25c
Standard bessemer rails, mill	$55.00
Stand. open-hearth rails, mill	57.00
Light rails, 25 to 45, mill	3.00c
Relaying rails, light, St. L.	60.00 to 67.00
Spikes, railroad, Pitts.	3.90c
Track bolts, Pittsburgh	4.90c
Track bolts, Chicago	5.115c
Tie plates, Chicago	3.25c

WIRE PRODUCTS

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	$3.50
Coated nails, Pittsburgh	3.45
Plain wire, Pittsburgh	3.25
Galvanized wire, Pittsburgh	3.95
Polished staples, Pittsburgh	3.65
Galvanized staples, Pbgh.	4.35
Barb wire, painted, Pitts.	3.65
Barb wire, galvanized, Pitts.	4.35
Cut nails, Pittsburgh	4.00

CHAIN, PILING, STRIP STEEL

(In cents per pound)

Chain, ⅜ in. proof coil, Pitts.	5.00c
Sheet piling, base, Pitts.	4.00c to 5.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 6.50c.

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SHEETS

(In cents per pound)

SHEET MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c
No. 28, open-hearth, Chi.	5.215c

TIN MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c

GALVANIZED

No. 28, open-hearth, Pitts.	6.25c
No. 28, bessemer, Pitts.	6.25c
No. 28, open-hearth, Chi.	6.465c

BLUE ANNEALED

No. 10, open-hearth, Pitts.	4.25c
No. 10, bessemer, Pitts.	4.25c
No. 10, open-hearth, Chi.	4.465c
No. 10, open-hearth, Phila.	4.435c

TIN PLATE

(Per 100 lb. box)

Tin plate, coke base, Pitts.	$7.75

IRON AND STEEL PIPE

Base Pittsburgh

Base Pittsburgh	Black Per cent off	Galv. Per cent off
½ to 3 in., butt, steel	51	37½
¼ to 3 in., butt, iron	33	17

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	30
Iron, 3½ to 4½ inches, c. l.	12½

CAST IRON WATER PIPE

(Class B Pipe)

Four-inch, Chicago	57.30
Six-inch and over, Chicago	54.30
Four-inch, New York	58.35
Six-inch and over, N. Y.	55.35
Four-inch, Birmingham	52.00
Six-in. and over, Birmingham	49.00

HOOPS, BANDS, SHAFTING

Class A pipe is $1 higher than Class B.

Hoops, Pittsburgh	3.50c
Bands, Pittsburgh	2.90c
Shafting, Pitts., carloads	17 off to list
Cotton ties, May, per bundle	$1.91

RIVETS

Structural rivets, Pittsburgh.	4.65c
Boiler rivets, Pittsburgh	4.75c
Rivets ⅞ in. & small., Pitts.	45 and 10 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	50–5 off
Cut thread	40–10–5 off
Larger and longer	40 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	50–10–5 off
Cut thread	50–5 off
Larger and longer	40–10 off
Cold pressed semifinished hexagon nuts ⅜ in. and larger	60–10–10 off
Cold pressed semifinished hexagon nuts ⅞ in. and smaller	70–5 off
Gimlet and cone point lag screws	50–10 off

NUTS

Hot pressed, square blank	2.50c off
Hot pressed, square tapped	2.30c off
Hot pressed, hexagon blank	2.30c off
Hot pressed, hexagon tapped	2.10c off
Cold pressed, square blank	2.25c off
Cold pressed, square tapped	2.00c off
Cold pressed, hexagon blank	2.25c off
Cold pressed, hexagon tapped	2.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago)

Quotation on leading products May 22, average for April, 1918, average for February, 1918, and average for May, 1917. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices May 22, 1918	Average prices April, 1918	Feb., 1918	May, 1917
Bessemer pig iron, Pittsburgh	$36.15	$36.15	$37.25	$44.95
Basic pig iron, Pittsburgh	32.95	32.95	33.95	42.15
*No. 2 Foundry pig iron, Pitts.	33.95	33.95	33.95	43.55
*No. 2, Foundry pig iron, Chi.	33.00	33.00	33.00	43.20
Lake Superior charcoal, Chicago	37.50	37.50	37.50	49.25
Malleable, valley	33.50	33.50	33.50	42.70
Malleable, Chicago	33.50	33.50	33.50	43.20
**Southern, No. 2, Birmingham.	33.50	33.50	33.50	35.75
*Southern Ohio No. 2, Ironton	33.00	33.00	33.00	38.60
Basic, eastern Pa.	32.00	32.00	33.00	40.75
**No. 2X Virginia, furnace	33.50	33.50	33.50	41.00
**No. 2X foundry, Philadelphia	34.25	34.25	34.25	43.25
Ferromanganese, 70%, delivered.	250.00	250.00	250.00	425.00
Bessemer billets, Pittsburgh	47.50	47.50	47.50	85.00
Bessemer sheet bars, Pittsburgh	51.00	51.00	51.00	88.00
Open-hearth sheet bars, Pitts.	51.00	51.00	51.00	88.00
Open-hearth billets, Pitts.	47.50	47.50	47.50	85.00
Steel bars, Pittsburgh	2.90	2.90	2.90	3.50
Steel bars, Chicago	2.90	2.90	2.90	3.84
Iron bars, Philadelphia	3.50	3.50	3.50	4.109

	Prices May 22, 1918	Average prices April, 1918	Feb., 1918	May, 1917
Iron bars, Cleveland	$3.64	3.64	3.64	3.25
Iron bars, Chicago mill	3.50	3.50	3.50	3.39
Beams, Chicago	3.00	3.00	3.00	4.34
Beams, Pittsburgh	3.00	3.00	3.00	4.00
Beams, Philadelphia	3.185	3.185	3.185	4.659
Tank plates, Pittsburgh	3.25	3.25	3.25	4.50
Tank plates, Chicago	3.25	3.25	3.25	5.49
Tank plates, Philadelphia	3.435	3.435	3.435	7.559
Sheets, blk., No. 28, Pitts.	5.00	5.00	5.00	7.00
Sheets, blue anld., No. 10, Pitts.	4.25	4.25	4.25	6.65
Sheets, galv., No. 28, Pitts.	6.25	6.25	6.25	8.80
Wire nails, Pittsburgh	3.50	3.50	3.50	3.50
Connellsville furnace coke	6.00	6.00	6.00	8.00
Connellsville foundry coke	7.00	7.00	7.00	8.50
Heavy melting steel, Pitts.	29.00	29.00	30.00	28.40
Heavy melting steel, eastern Pa.	28.50	28.30	30.00	26.00
Heavy melting steel, Chicago	29.00	28.65	30.00	28.70
No. 1 wrought, eastern Pa.	34.00	34.00	35.00	40.75
No. 1 wrought, Chicago	33.50	33.50	35.00	36.40
Rerolling rails, Chicago	34.00	34.00	35.00	36.80

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

(For Additional Prices See Page 1344)

Foundry War Work Shows Up Light

Partial Survey of Pig Iron Consumption Discloses Only 50 to 60 Per Cent of Castings Plants Are Filling Essential Demands—Steel Works About 90 Per Cent—Adjustments May Follow

Pittsburgh, May 21.—Broadening the scope of the survey regarding the pig iron situation, a form has been made out and sent to producers of ingot molds, who have been requested to use it to learn the nature of the requirements of their customers. The data will show the tonnages involved, the kind of contracts represented by production from the molds, time of deliveries, etc. This work follows the line of that being done by blast furnace interests who are receiving reports from their customers. The reports already made show that an extremely high percentage of steelmaking iron shipped and under contract is being used for direct and indirect government work. It is understood that reports coming from consumers of foundry grades show that a large tonnage is entering into the manufacture of so-called less essentials and as a result a sharp readjustment may be brought about so as to shut off supplies for this purpose and to divert tonnages to strictly war uses. In case any surplus then remains, as some think is probable, it will be allowed to move to consumers engaged on less important production. The survey is being conducted by the committee on ore, pig iron and lake transportation. Except for a few sales involving small lots of off iron, chiefly foundry grades, no transactions are taking place. Consumers realize the fact that no tonnages are available, barring the character mentioned, and as a consequence new inquiries are extremely limited. Furnace interests generally have adopted the policy of referring inquirers directly to the war industries board.

Bookings are Heavy

Boston, May 20.—Inquiries for pig iron are as numerous as ever, but the actual amount of business closed is very limited. While the furnaces are doing better in the matter of production, thanks to a more regular coke supply and less labor difficulties, there still stands ahead of them the immense business booked some time ago and on which they are still very much behind on deliveries. At one office, orders aggregating 28,000 tons were on hand and in others while less definite as to actual figures, it was admitted that a good many orders had accumulated through the disinclination on the part of the furnaces to accept business. There is little doubt that it is only a matter of a short time before the distribution of iron will be purely a governmental function. As matters stand now, it is probably no exaggeration to state that from 90 to 95 per cent of the iron now coming into this territory is for government work, and when the questionnaires now being circulated among the users are filled out and returned that it is going to be extremely difficult for those concerns not working on some kind of government work to secure supplies. Not only that, but there are now few of the local trade who doubt that some such zone system as exists with regard to coke supplies will be applied to local iron requirements. The barring of outside coke from New England was dictated by the transportation situation and local iron men figure it out that if the desire is to make present facilities adequate, this can be effected only by cutting off shipments from Virginia and Alabama. The government is

going to have an increasing amount to say as to sales and deliveries of iron, and in view of the attitude of the furnaces toward new business, it is apparent that the big producers are not adverse to the new arrangements.

Eastern Operations Improve

New York, May 20.—Now that eastern furnaces are receiving enough coke to enable them to maintain their operations at maximum, indications are that it will not be long before they will be in a better position to cope with the demand. In fact, some makers go so far as to say that by the end of June or the beginning of July, there will be enough pig iron to meet all requirements. This change in the situation, however, still is reserved entirely for the future, since many consumers still are short of iron for current consumption. Large numbers of inquiries for prompt iron of necessity still are being ignored by the furnaces. The amount of prompt iron now being sold has been decreasing steadily of late, due to the fact that consumers are so anxious to obtain deliveries on their contracts, that many of them are accepting off grades without question. As a result, sales of prompt iron which were made during the past week apparently aggregated only 1000 to 2000 tons. In general, the furnaces continue to refrain from quoting on second half business. The only exception which is reported is the sale of 3000 tons of copper-bearing low phosphorus for second half. Only a few eastern furnaces so far have distributed questionnaries among their consumers. It therefore is considered unlikely that they will be filled in and returned by May 23, as requested. The Reading Iron Co. will blow in its Emaus, Pa., furnace about July 1. The new No. 2 blast furnace of the Seaboard Steel & Manganese Corp., at Temple, Pa., is to be blown in about June 10 on foundry iron, to be switched later to 70 per cent ferromanganese.

Demand Strong as Ever

Buffalo, May 21.—The pig iron situation in this district remains quiet with little or no trading. The furnaces are doing no business pending the return of the questionnaries. The inquiry continues almost as good as ever, though it has been somewhat dulled by the discouraging information furnacemen have had to give inquiries for months past. Certainly the demand is, if anything stronger than ever. There is hardly a consumer who wouldn't like to get some iron, and furnace representatives say they could dispose of any tonnage whatever, if they had it to sell. One sales agency has done, during the past week, a little business in carload lots. The transition of the plants to government production is gradually proceeding. The questionnaires that have been sent out by all the furnaces to customers will be sent to Washington when they are filled. This will give the government an idea of the tremendous volume of the commercial demand.

Off Grades Only Sales

Philadelphia, May 21.—Current sales of pig iron are made up almost entirely of small prompt tonnages mainly of an off-grade character. No future iron is being sold. In some quarters it is believed that improved operations will enable them to make much better deliveries than expected. Several furnaces who thought they would not be able to furnish first half deliveries until the third quarter now believe they may have more first half iron to distribute than they had expected.

Foundry War Work Limited

Cleveland, May 21.—Such partial returns as have been returned by producers in this district from their customers to the questionnaire recently circulated, indicate that the capacity of foundries now engaged on direct or indirect war work is less than expected. It is shown that not over 50 to 60 per cent of the present melt is for essential production. This applies both to malleable and gray iron plants. Steel plants show about 90 per cent of war orders. The effect of the questionnaire has been in some cases to bring back to the furnaces inquiries for additional iron. Inquiries for 1919 delivery are more numerous. At the rate the canvass is proceeding it probably will be several weeks before any definite data can be assembled. Allocations of the week by the committee on pig iron, iron ore and lake transportation call for 8000 to 10,000 tons of foundry iron for plants doing Emergency Fleet corporation work. These include 3500 tons of No. 24 for a Minneapolis melter; 2575 tons of three foundry iron grades and 225 tons of malleable for the Westinghouse Electric & Mfg. Co., Essington, Pa.; 1250 tons of No. 24 for a Detroit shipbuilder; 700 tons of No. 2 foundry for a Milwaukee user. Delivery in all cases is to start at once or in June. For the ordnance department, 800 tons of No. 24 were placed for a Stowe, Pa., plant and a small lot for Stamford, Conn., delivery. A Chicago independent steelmaker is to receive 1000 tons of 10 per cent bessemer ferrosilicon by allocation. Local foundries doing general jobbing business continue to experience a considerable slump in orders.

Chicago Situation Easy

Chicago, May 21.—Some increase is noted in requirements of the government for pig iron to be shipped immediately to manufacturers producing war materials. This has not yet attained sufficient proportions to be embarrassing to local producers, and every request is being taken care of promptly. This district is peculiarly situated in this respect. All the merchant pig iron except the comparatively small output of the Bay View furnaces is marketed by one selling interest, and as a result nearly all consumers are its regular customers. This makes it easy to adjust the conflict of government prompt requirements and contract shipments. Inquiry is not active simply because consumers have found they are unable to place further tonnages for this year's delivery. However, were books to be opened, there is no doubt large tonnages could be placed at once, as many consumers are ready to take on considerable iron if available. Southern furnaces are not selling at present. Although they have considerable last half tonnage not yet covered, they hesitate to take further contracts until assured of obtaining sufficient fuel. There is no incentive for selling far ahead, as price is fixed and there is no doubt of full production being required for months to come.

Southern Offerings Less

Cincinnati, May 20.—From all accounts the market is dead, as far as new contracting is concerned. Southern producers who had some iron to offer a few days ago are now unable to take on any business, with the exception of a few favored customers, who have been allowed to add to previous purchases. The percentage of sales for nearby shipment is very small and probably lower than at any time this season, if estimates of reliable concerns are accepted. Iron is moving much faster from the Birmingham district, and no requests have been received to hold up shipments. On the other hand, melters are willing to take all the iron they can get and pile it for future use. However, foundry yard stocks are not at all heavy. Much interest is taken in the proposed plan to distribute shipments of both basic and foundry, but so far no definite steps have been taken along this line. The inquiry is lighter, although there is a great deal of last half business that

can be booked if the furnaces were able to supply the iron.

Heavy Tonnage is Begging

St. Louis, May 18.—New commercial inquiries for iron during the past 10 days have been heavy, despite the generally recognized fact that no tonnages are to be had. Consumers are registering their demands with every possible source of supply in the hope that some happy accident may result in their getting a stray car or so. One dealer says that inquiries received during the past two weeks will aggregate 5000 tons, all for southern foundry. There is little doubt that upwards of 100,000 tons of all varieties could be placed in the district proper by telephone. Every day brings accounts of lucrative business being rejected. Shipments have been coming along somewhat more regularly, due to the lifting of embargoes in the middle west. This is especially true with regard to metal from the Birmingham district. Quite a number of diversions in transit have been reported this week, and local plants not engaged on government contracts have become reconciled to the determination to favor war essentials. Representatives of southern furnaces report a heavy demand, but declare they hardly expect anything more than a scant provision for regular clients and possibly a few small lots additional through the balance of 1918. They freely admit even these expectations may be upset by government intervention. Nothing in the way of actual business consummated was heard of this week.

Practically Out of Market

Birmingham, Ala., May 21.—Southern furnace companies repeat their assertion that they are out of the market. The probable make for the last half of the year has been sold against quite liberally. Priority shipment orders required by the government are being followed on a constantly increasing scale and the prospects are that it will not be long now before the government is positively directing deliveries of all pig iron and steel products. Inquiries are being received for iron from all directions. Regular customers are willing to accept delivery at any time, even into next year. Efforts to produce the largest output in the history of the district during this month will hardly bring about desired results for the reason that there is much complaint against the quantity and quality of labor and raw material supplies. Accumulated stocks of pig iron are being reduced steadily but there still is a large amount on hand.

Coke Shortage is Passed

Oven Plants Are Sending Forward Shipments So Satisfactorily That Complaints Are Few—Car Supply Ample

Pittsburgh, May 21.—Shipments of coke are moving satisfactorily to blast furnaces and there are practically no complaints of shortages of fuel. Under the direction of the fuel administration shipments have been diverted from idle to active stacks. The order giving a 100 per cent supply of cars to the Monongahela railroad still is in effect, and the supply on the Pennsylvania railroad is averaging about 95 per cent. With the proper organization of working forces at the ovens in the Connellsville region greater tonnages will be loaded, and when the region is on a producing basis of 75 per cent of the car supply it is believed adequate tonnages for all furnaces will be available. Rigid enforcement of the order of the Pennsylvania railroad prohibiting the movement of coke to eastern furnaces off its lines in hopper cars is in effect. This order was issued April 1 but was not strictly adhered to until recently. Production for the week ending May 11, totaled 341,110 tons as compared with 333,455 tons for the preceding week, according to *The Connellsville Courier*.

Price Now is Secondary

Boston, May 20.—There have been no new developments of note in connection with the coke situation, save that the desire to be covered is becoming of more importance to the foundries than the price and those who at first were inclined to balk at paying the difference between the figure at which they contracted Connellsville for and the price of the local by-product oven coke, now are reported to be covering their needs. Connellsville operators did the best they could to meet their contracts prior to May 15, and there was quite a rush of supplies into this section before the fuel administration order became effective.

Stacks Are Cold

Chicago, May 21.—Inasmuch as steelmakers have only the idea of production before them at present and are not interested in contracts or price, it is a matter of much concern that the fuel situation leaves much to be desired. At this season, when fuel should be moving steadily, the Illinois Steel Co. finds it cannot obtain sufficient to keep all blast furnace stacks active and at present has four stacks cold. One at Milwaukee and one at Joliet have been in this condition since last winter and within the past 10 days it has been necessary to blow out one at Joliet and one at South Works.

Shipments Well Regulated

Cincinnati, May 20.—Shipments from the different fields are now so well regulated as to insure very little fuel getting into the hands of nonessential consumers. In this plan the hearty support of the coke producers has been in evidence, although they have not been able to enlist labor in carrying out the general idea for increasing the production. Reports from different fields differ. A complaint from Connellsville is that an important percentage of foreign-born labor recently laid off for religious celebrations and that substitute labor was difficult to obtain.

Only Odd Cars Obtainable

St. Louis, Mo., May 18.—Since the first of the month coke dealers here have been intensively combing all fields in the hope of getting together tonnages sufficient to meet part of the urgent demands. The net results in the main have been utterly disappointing. Apparently there are no surplus tonnages, even among the most important by-product manufacturers. One dealer said today he had spent two weeks in personally visiting gas ovens in Illinois and Indiana, but had been unable to secure more than half a dozen cars, and most of the plants he saw will have nothing to offer before the end of August. Metallurgical coke continues the scarcest commodity in the list of steel-making materials here, but more especially to the west and southwest. Deliveries from the Connellsville and Virginia ovens are spasmodic and unsatisfactory.

Southern Demand at Maximum

Birmingham, Ala., May 21.—The coke demand in the south is still above the production and very few orders are being accepted by producers. Every oven in shape is in operation and the output is above the figures of last year at this time. Still there is an apparent shortage. Announcements some time back that within two months it might be possible for some of the old contracts to be worked off, have brought about some inquiry again out of the regular line but there is very little that can de done.

Scrap Supplies Are Scant

But Absence of Speculation Keeps Market on Even Keel—Consumers Paying Commission to Dealers

FOR COMPLETE SCRAP PRICES SEE PAGE 1344

Pittsburgh, May 21. — Maximum prices are being commanded by all standard grades of scrap, according to dealers. The most active demand is being made for heavy melting steel and low phosphorus grades of which there is said to be a scarcity. Dealers claim that there is a general shortage of all the leading grades, although there has been a large supply of miscellaneous material which suddenly has come to yards and is being assorted and prepared for the market. Secondary grades still are available at less than maximum levels. Consumers who have been buying directly from producers previous to the allowance of the commission of 3½ per cent to dealers, now are buying through the latter and are willingly paying the commission.

General Demand Good

New York, May 20.—A good demand prevails for virtually all grades of scrap in the New York market. As a result, prices generally are tending upward. Wrought pipe, under the new specifications, is now holding at $30 to $30.50, an advance of 50 cents a ton. Cast borings have made a similar gain, dealers offering at this time $16.50 to $17. No. 1 machinery cast and No. 1 heavy cast have advanced to $32.50 to $32.75 and $32.25, respectively. Stove plate and grate bars are strong at $23.50, which is slightly higher than the level of last week. Trading, while of good volume, is of a purely perfunctory nature, and the situation generally is featureless.

Shipping Old Contracts

Philadelphia, May 21.—Important transactions in scrap are lacking. Deliveries on old contracts call for all the heavy melting steel available. In fact in no grade is there any tendency toward accumulations. Cast scrap and wrought are in active demand.

Supplies are Scarce

Boston, May 20.—There is no lack of demand for the various grades of scrap in this section; the greatest difficulty that dealers have is in securing sufficient supplies. The turnover suffers from this fact and while the market is fairly satisfactory from the fact that practically all kinds of stock are selling at full government maximums, plus commissions, dealers would be better pleased if they could secure greater supplies. More or less trouble is still had in securing permits for shipments to distant points of consumption, but the situation in this respect is better than it was a few weeks ago. New England foundries are still hungry for cast scrap and a much larger business might be done if supplies permitted. Very few car wheels are available. Wholesale dealers' paying prices per gross ton, f.o.b. cars, shipping points, follow: Wrought No. 1, yard long, $29 to $30; horseshoes, $29 to $30; cotton ties, $22 to $23; stove plate, $21 to $22; No. 1 machinery $31 to $32; No. 2 machinery, $27 to $28; car axles, iron, $42 to $43; steel, $42 to $43; rerolling rails, $30 to $31; iron boiler plate, $33 to $34; bundled barrel hoops, $16.50 to $17.50; wrought iron pipe, new specifications, $28 to $29; steel rails, $25 to $25.50;; No. 1 railroad steel, $25 to $25.50; heavy melting steel, $24.50 to $25; axle turnings, $20 to $21; machine shop turnings, $14 to $15; cast borings, $15 to $16; drop forge trimmings, $22 to $23; cast iron car wheels, $27 to $27.50.

Probing Turnings Sale

Buffalo, May 21.—The market for all kinds of scrap is very strong. Heavy melting steel is in very active demand. There are indications that consumers are looking beyond their immediate needs which are heavy and are accumulating stockpiles to meet the inevitable strain of next winter Demonstrating the strength of the market in cast borings, a sale was made during the past week at $19, the government price. Borings are in good demand. Railroad scrap is changing hands, but not through the dealers. It is in almost every case going direct to the consumers, except in the case of rough scrap which must of necessity, go through the yards. Some mills in this district have consummated transactions under the new ruling allowing 3½ per cent commission. It is understood that a transaction made some two months ago in which an eastern consumer bought shell turnings at $36.50 is being quietly investigated.

Consumers Want Steel

Cleveland, May 21.—Heavy melting steel continues in heavy demand in this district, but sales are restricted by an acute shortage of supplies. Rolling mill and foundry scrap is not moving fast on account of hesitancy on the part of consumers. Turnings are a trifle stronger than last week. One Cleveland interest has purchased several thousand tons at about $18, for blast furnace use in the past few days. Consumers feel that lower scrap prices will be in order in the next quarter and accordingly are not in any hurry to buy. Fewer shell turnings are on the market than dealers expected, since Washington is directing to more or less extent the disposal of scrap on its shell contracts. So far as actual trading is concerned, dealers contend that the past week has been the dullest of the year to date.

Chicago Market Livelier

Chicago, May 21.—Increased inquiry is being received for iron and steel scrap in the Chicago market, practically all grades being in demand, except that No. 2 wrought is less sought after. Activity is particularly marked in heavy melting steel and malleable grades. Consumers of heavy melting steel in the east are in need of considerable tonnages and are obtaining permits for shipments at their expense because of their inability to obtain sufficient supply in their natural territory. This is causing considerable heavy material to move eastward from this point. Comparatively little railroad scrap is being offered, a list of 350 tons being offered by the St. Louis & Southwestern railroad.

Interest is Limited

Cincinnati, May 20.—Consumers of scrap are taking little interest in the market with the exception of those who use heavy melting steel and No. 1 machine cast. Stove plate has been a trifle more active, but no advance has been made. Common comment is that offerings are so light. Whether yard stocks are being reduced is a matter for speculation, although as shipments are now going forward more rapidly the assumption is that these stocks are being reduced at a gradual rate.

Sales Are Exceptional

St. Louis, May 18.—Purchases of small tonnages by the local car plants constituted about the only activity in the local scrap market this week. Mills and the general run of consumers are showing a decided disposition to hold off. Offerings from all quarters continue extremely light for this particular season. Dealers explain this by saying that price fixation has acted as a damper of efforts to collect and sell. Elimination of the spec-

ulative element has robbed the market of virtually all its life. Consumption is maintained at the recent maximum rate. Fairly prompt deliveries have resulted in the maintenance of stacks by most of the important melters. There is no urgency in the demand for any particular grade, and heavy melting steel, which last month was scarce, is apparently plentiful at the moment. Generally prices hold steady, but the tendency of the market is to stiffen. Several dealers marked up malleable grades slightly this week and there was also a slight advance in iron rails. Railroad offerings are light, the only lists this week being the Wabash, 5000 tons; St. Louis Terminal railroad, 800 tons, and Cotton Belt, 600 tons.

Sheet Output is Crippled

Shortage of Sheet Bars Keeps Mill Operations Irregular and on Greatly Reduced Scale—Western Sales Few

Youngstown, O., May 22.—Sheet mills in this territory are operating irregularly on account of the acute shortage of sheet bars. Several mills are idle for this reason and makers say they cannot plan from one week to the next. The leading maker of bars at times is short of this material and right now several of his sheet mills are idle for this reason. Contracts closed some time ago with this company are being filled whenever enough steel is available to convert into sheet bars, and this is causing a shortage of bars in the company's sheet mills. Approximately 400 tons of black sheets were shipped recently to the French government and will be used for covering box cars. All the mills here are heavily booked with government tonnage and few sheets are reaching the domestic trade.

French Allotment Made

Philadelphia, May 21.—Additional orders for blue annealed sheets for shipment to France have been allotted to the leading eastern maker through government agencies. These will amount to several thousand tons.

Operations Do Not Improve

Pittsburgh, May 21.—Operations of sheet mills do not improve. Output is restricted by the scarcity of sheet bars. The American Sheet & Tin Plate Co. is producing at the rate of about 50 per cent of capacity while the output of independent mills is about 80 per cent of capacity. The entire production is for the government, either direct or indirect, and it continues to place good-sized orders. The Emergency Fleet corporation has bought large tonnages of blue annealed sheets.

Western Mills Sell Nothing

Chicago, May 20.—Except for government requirements, which are less exacting in the case of steel sheets than in any other finished line, mills are not taking on any new tonnages. The leading independent is able to make shipments to customers on former contracts, but has not been in the market for new business for several weeks.

Discard Steel

In Growing Demand Owing to General Shortage of Rerolling Material

Cleveland, May 21.—Demand for discard steel is very active owing to the acute shortage of standard semifinished material. Prices paid in some cases are as high as $50, mill, when this material has been marketed in the form of small billets. Ordinarily it is bringing from $45 to $47.50, or up to the maximum base for rerolling billets. One buyer freely canvassed the market in this district this week with offers of $44 without much result. Usually sales are of moderate lots as they accumulate, but a producer in this district has sold his output for a period of months involving a round tonnage. Discards are being used for a wider variety of purposes. Makers of small tools now are buying them. Government rejections of forging steel were sold here this week at maximum prices.

Slabs are Requisitioned

Philadelphia, May 21.—Another slab tonnage from an eastern maker has been requisitioned by the government in behalf of the eastern plate mills.

Demand is Unsatisfied

Pittsburgh, May 21.—Demands for semifinished steel continue to be heavy and denote plainly that consumers are unsuccessful in their efforts to cover requirements. Sheetmakers are extremely short of bars and as a result their output is considerably restricted. Platemakers are scouring the market for slabs, and consumers of billets are increasing efforts to cover requirements, although the demand for billets is not so heavy as that for sheet bars. Makers of semifinished steel are exerting themselves to supply tonnages wherever possible, but do not see any indication that they will be able to do so fully in the near future.

Strip Demand is Active

Pittsburgh, May 21.—Active demand prevails for cold-rolled strip steel, makers of which have pledged their entire output to the government. They are operating almost at capacity, but have had to curtail output somewhat on account of a scarcity of billets and slabs. Stocks which some had on hand almost are depleted.

Labor Shortage

Handicaps Production of Cast Pipe—Government Buying Wrought

New York, May 20.—Severe shortage of labor continues to impose great hardship on eastern manufacturers of cast iron pipe. Several of the shops are operating at around 50 per cent while others are able to do but little better. This in conjunction with a continued good demand for the smaller sizes of pipe has made deliveries on this material increasingly difficult. At present, eastern foundries as a rule are unable to ship 6 and 8-inch pipe before August, and 12-inch before July. The larger sizes, however, especially from 24 inches up, are available for relatively early shipment.

Buying Line Pipe

Pittsburgh, May 21.—Oil country interests are buying good-sized tonnages of 4, 6 and 8-inch iron and steel lap weld pipe for lines being laid in the south for the government. Tonnages are also being taken for shipment to France, according to report.

Western Demand Light

Chicago, May 21.—Requirements of cities for cast iron pipe to go into extensions this summer continue to be almost negligible and orders following the marketing of improvement bonds have not yet made their appearance.

Pipe Plants Readjusted

Birmingham, Ala., May 21.—Cast iron pipe plants in the Birmingham district now are in position to take on some of the big foundry and machine shop business that is being offered since readjustments of plants have been made. The cast iron pipe business still lags with no prospects of a material improvement at any time this year.

Shell Bar Tonnage Placed

Chicago Mills Allotted 75,000 to 100,000 Tons—Railroad Bar Orders Awaited—New Capacity in Service

Chicago, May 21.—Specifications for shell steel rounds are being placed and an independent maker in the west has been allotted 28,000 tons, while the leading interest has been given a larger tonnage as part of the same order. Outside of government requirements, comparatively little is being done in steel bars and mills find it difficult to ship more than occasional small tonnages to regular customers not engaged on war work. No new contracts are being made with this class of consumers. In bar iron the situation is extremely quiet with nothing new being taken except small tonnages where specifications accompany the order, though the total of this business is a fair aggregate. No contracts have been made for second half delivery and consumors are not asking contracts that far ahead. The railroad car situation is not changed, but mills are relying on this order to give them business for last half. Hard steel bars are being inquired for strongly, one request for 1000 tons for government work from a manufacturer not ordinarily using high carbon steel being received recently. Most inquiry is not being considered as mills are unable to obtain sufficient rerolling rails.

Discards are Sold

Philadelphia, May 21.—Quietness prevails in the bar iron market. Steel bars rolled from shell discards are selling well for reinforcing, forging and general machine work.

War Work Absorbs All

Pittsburgh, May 21.—Makers of iron and steel bars are engaged practically altogether on government work, either direct or indirect, and will take no other business. Implement makers have been given preferential classification by the government and are taking tonnages, but probably will be in the market sooner for much greater requirements for 1919 business. The 10-inch bar mill at the McDonald plant of the Carnegie Steel Co., Youngstown, O., began to roll steel on Wednesday of last week. It will produce rounds and squares up to 1¼ inches, hexagons up to 1¼ inches, flats up to 3 inches wide, concrete bars up to 1¼ inches, angles 1 x 1-inch up to 1¾ x 1¾ inches and small merchant mill shapes. The mill has a monthly capacity of about 7500 tons and is rolling from 4 x 4 billets obtained from the Ohio works of the Carnegie company.

Iron Bars Strong

New York, May 20.—The iron bar market has strengthened materially in this district during the past few weeks and nothing more is heard of the 3.30c and 3.35c, Pittsburgh, quotations which were being offered. Shading of the government maximum now either is exceptional or is lacking altogether. All of the current business appears to be going at the full price of 3.50c, Pittsburgh, or 3.695c, New York. Domestic demand for iron bars is of larger proportions. Preference in all cases is being given to government business; owing to the fact that the mills are not crowded with work, however, they are not restricting their new business to priority orders. Demand for bars rolled from shell discards is increasing steadily. Such bars are being used on an increasing scale by machine and forging shops which are unable to get steel of the usual specifications. A fairly large business is being booked in both iron and shell discard steel bars, for shipment to the Argentine, Chile, Brazil, South Africa, Australia, Japan, China and other countries, on government permits.

Large Bolt Inquiries Pending

Chicago, May 21.—It is understood that tentative allotment has been made of the government's requirement of more than 100,000,000 bolts and nuts and is now awaiting the proper government authority. No word has been given out as to the distribution of this large order. Other inquiries for large quantities of bolts and nuts still are pending. Practically all makers are well booked up and some embarrassment is being met by lack of shipping instructions on material ordered for immediate shipment and ready to move.

Shafting Tonnages Taken

Pittsburgh, May 21.—Round lots of cold-rolled shafting are being placed with makers, virtually all of the tonnage being either directly or indirectly for the government. Demand is most active for the larger sizes, 2¼ inches and more, and difficulty is being experienced in getting sufficient steel to meet requirements. Smaller sizes are also in fair demand, but production is considerably below capacity owing to shortage of steel. The trade is interested in the situation with regard to the proposal to cut down greatly the output of automobiles, makers of which take large tonnages of shafting. The demand for screw stock is light.

Bolt Requirements Large

Pittsburgh, May 21.—Requirements being made upon producers of nuts, bolts and rivets are large, and are for the government either direct or indirect. Makers are able to get steel bars for this class of business only. They are operating at about 90 per cent capacity. Jobbers report that their stocks have been reduced considerably and that they are unable to replace them fully.

Hoop Steel Tonnage Taken

Pittsburgh, May 21.—Tonnages of hoop steel are being taken by makers of oil and other kinds of barrels, who are engaged in supplying requirements of the government. Mills are unable to take any business except that which is for the government either direct or indirect. It is reported that tonnages still are being bought for shipment to France. The next unit of the McDonald plant of the Carnegie Steel Co., Youngstown, O., which will go into operation probably will be a 10-inch hoop mills. It will have a capacity of approximately 6000 tons a month and perhaps will begin rolling about July 1.

Protest Wins

And 12,000 Tons of Ferro Will be Imported—Market Strong

New York, May 20.—The vigorous protests against the action of the war trade board in prohibiting imports of ferromanganese and spiegeleisen, have resulted in a modification of this restriction. The war trade board has agreed to permit the importation of 12,000 tons of English ferromanganese, provided that licenses for exporting this tonnage to this country are granted by the British government.

At the instance of the American Iron & Steel institute requests now are being made upon consumers to accept deliveries of 70 per cent ferromanganese even where they have 80 per cent metal under contract, except where their practice absolutely forbids. This transfer is to be made on the basis of an equal number of manganese units as due allowance made.

The principal transaction in the ferroalloys markets during the past week was the placing of 4000 tons of 16 per cent spiegeleisen by the Cru-

cible Steel Co. of America. About one-half of this tonnage went to one maker and the remainder was distributed among several others. With this exception, business in spiegeleisen during the past week comprised only small tonnages. The market on 16 per cent spiegeleisen continues to be quoted at $75 to $77 at the furnace, for spot shipment, and at $70 for futures.

Only small transactions featured the ferromanganese market during the past week. Seventy per cent metal continues to be quoted at $250, delivered.

The market on 50 per cent ferrosilicon continues easy, both for spot and contract metal, and may be quoted at $150 to $155, delivered.

Market Strong and Active

Pittsburgh, May 21.—Activity and strength are reflected in the market for ferro alloys. Consumers evidently are covering requirements as quickly as possible in the belief that prices are going to advance soon and that tonnages are going to become scarcer. This appears to be especially true of ferromanganese and spiegeleisen. The embargo preventing imports of ferromanganese has caused anxiety, and consumers are hoping that it may be lifted at least temporarily. Tonnages of this alloy are reported to be available in England. The British government is said to be opposed to shipments because of the time required to load and unload vessels. Cutting down of imports of manganese ore also has made the market firmer. The Crucible Steel Co. of America has bought 1000 tons of 70 per cent ferromanganese from three interests for shipment during the last half at $250, delivered, and 4000 tons of 16 per cent spiegeleisen from the the same sellers, also for last half. The price paid is said to have been equivalent to $73, delivered. A valley consumer has purchased 500 tons of 70 per cent ferromanganese for last half shipment at $250, delivered, and the Carbon Steel Co. has taken a similar tonnage at the same price for shipment during the next 60 days. Another Pittsburgh consumer has taken 100 tons for spot shipment. An inquiry is out for 500 tons of 18 to 20 per cent spiegeleisen, which some makers are holding at $85, furnace. Demand for 50 per cent ferrosilicon is fair and spot now is quoted at $170, delivered, and for last half at $155.

Western Market Steady

Chicago, May 21.—Ferromanganese is in good demand and selling for last half delivery is going on steadily for the 70 per cent grade.

Need Plates in Big Lots

Chicago Producers Take 200,000 Tons—Lake Boats Call for 200,000 Tons Additional—Japan Gets Half of Old Orders

Chicago, May 21.—One of the heaviest orders for ship material received in the west since the war began was given the principal interest late last week, involving material for 50 steel boats to be built by the Skinner & Eddy Corp., on the Pacific coast. This is estimated to involve approximately 200,000 tons, mostly plates. Some difficulty is expected in giving required deliveries on this large tonnage in view of other obligations already on the books. Other specifications have been filed in steady volume for smaller tonnages and the total plate requirements aggregate a heavy tonnage. Division of the steel requirements for the carbuilding program has not yet been made and much interest is attached to the course which will be the following in obtaining this material, in view of the urgent necessity of furnishing shipyards sufficient steel to keep them busy.

To Roll Japanese Orders

Philadelphia, May 21.—Licenses for plates for export to Japan recently granted by the war board cover only such material as is now on the Pacific coast, or about 40,000 tons. It is understood that to fill the remainder of the tonnage now due to Japanese buyers on old orders, the mills will roll altogether a total of about 87,000 tons. This grand total of 127,000 tons to be supplied from Pacific coast stocks or new rollings, is slightly more than 50 per cent of the Japanese plate orders now on the books. The allocation of the steel for the 100,000 government cars is expected soon. This business will go largely to companies having 72-inch mills or smaller, so as not to interfere with large shipbuilding production. The steel distributing committee of the American Iron and Steel institute has protested against the proposal of the Emergency Fleet corporation to allow 20,000 tons from June rollings for use in the building of 60 additional 7500-ton vessels. The committee contends that the fabricators will not be ready to handle these plates for several months. Several thousand tons of plates have been placed for France and large tonnages are to be closed in England and Italy. Numerous government lots for domestic buyers also have been placed.

To Distribute Steel

Pittsburgh, May 21.—Steel for the carbuilding program is about to be allotted by the war industries board, according to reports reaching the trade here, and the work will be directly under the jurisdiction of J. Leonard Replogle. The 100,000 cars will require approximately 1,400,000 tons, and makers, it is understood, will be given the option of rolling either bessemer or open-hearth steel, or both, and sheared or universal plates. Platemakers are engaged altogether on government work and are declining other business

Big Tonnage For Lake Boats

Cleveland, May 21.—More than 200,000 tons of steel including the boiler material, will be required for 130 additional vessels for the Emergency Fleet corporation which it has been arranged by Director General Charles M. Schwab will be built by lake shipyards, for delivery at the end of the season of 1919. The ships will be of 4200 tons deadweight capacity each. The American Shipbuilding Co., which recently received 66 boats, is to obtain 60 additional, requiring 105,000 tons of steel. The Great Lakes Engineering Co., of Detroit, will build 24 additional; the Manitowoc Shipbuilding Co., 12; while the Toledo Shipbuilding Co., Saginaw Shipbuilding Co., McDougall-Duluth Shipbuilding Co., and the Globe Shipbuilding Co., of Detroit, will construct the remainder.

War Board May Take Tin Jurisdiction

Pittsburgh, May 21.—Tin plate mills are operating at the rate of about 95 per cent of capacity, shipments are satisfactory and stocks have been reduced to about normal proportions, or one week's output. Production at present is on the basis of probably 825,000 base boxes weekly. It may be expected to show a decline when hot weather arrives. Heavy demands are provided for in estimates of the food administration and probably exceed actual requirements. Regular customers are practically covered for the last half. The price for this delivery has been left to the war industries board, which it is reported, is to assume a still broader control over steel distributors, which may bring tin plate tonnage directly under its jurisdiction.

Official Prices Revised to Date

General Institute Committee Announces Many Changes in Base Figures, Differentials and Extras—Pig Iron Schedule Amplified—Shell Turnings Defined—Cast Iron Pipe Advanced $6—Chrome Ore Ruling

NEW YORK, May 21.—Many important revisions and amplifications of base prices, differentials and extras in various iron and steel products previously recommended are contained in a voluminous statement announced by Chairman E. H. Gary on the committee of steel and steel products of the American Iron and Steel institute. This statement brings up to date all extras and differentials as previously published in the price pamphlet issued by the institute several months ago. Some announcements on base prices also are given. The prices of steel bands, hoops and unfinished hot rolled strip steel for cold rolling are reaffirmed, by the substitution of new bases and cards of extras. Heretofore these prices were given in the form of extras over the steel bar card. A new base of $7.50, Pittsburgh, per 100 pounds for 1-inch common chain is shown. The former base was $8 for ⅜-inch coil. A ruling covering chrome and ore consumption is given. Cast iron pipe prices have been advanced $6. Large rivets are reduced.

Some important changes are made in the pig iron differential list. These apply to high silicon bessemer iron, to charcoal iron, to silveries and to low phosphorus grades, both copper free and copper bearing.

Among the additions to the extra and differential list are those applying to sketch steel boiler plates; to boiler tubes, including lap-welded superheater and seamless tubes; to sheets covering extras for forming flanging and miscellaneous points. Tin plate extras on charcoal 107 pounds or over are cancelled and a new series substituted. Further amplification is made of the scrap schedule to cover low phosphorus scrap and shell turnings, about which there has been some confusion.

Judge Gary's statement in making the announcement is as follows:

The committee on steel and steel products of the American Iron and Steel institute has received from a subcommittee reports based on information received from representative manufacturers of various lines of steel and steel products, and from such reports and other data available the committee has concluded that certain changes and modifications in the maximum prices, differentials, extras, etc., as heretofore recommended by the institute and published in its pamphlet dated January, 1918, are fair and reasonable, and the committee recommends that revised maximum prices, differentials and extras be adopted to take effect immediately, as follows:

PIG IRON

The base price of $33 per gross ton f. o b. furnace applies from and after April 1, 1918, to No. 2 foundry pig iron only.

Basic iron, $1 below base price.

Bessemer iron up to 3 per cent silicon, 10 per cent above price of basic.

For bessemer irons over 3 per cent silicon:

	Gross ton
3 to 3½ per cent silicon add.....	$2.00
3½ to 4 per cent silicon add.....	3.00
4 to 4½ per cent silicon add.....	4.00
4½ to 5 per cent silicon add.....	5.00

Above extras for high silicon bessemer iron are to be added to the base price of bessemer iron not exceeding 3 per cent in silicon.

Charcoal Iron

Southern or warm blast charcoal iron, ranging from 0.40 to 0.60 phosphorus.

For silicon up to 2 per cent, a maximum of $10 per gross ton over base.

For silicon over 2 per cent, add to above differential $1 for each ½ per cent of silicon above 2 per cent.

Cold blast charcoal iron, a maximum of $47 per gross ton above base, with customary reductions for lower grades, as recognized by the trade.

Northern semi-cold blast iron, a maximum of $22 per gross ton above base.

Lake Superior iron, $2.50 per gross ton above base for iron averaging 1.25 per cent in silicon. Other grades to be adjusted as per the custom of the trade, depending upon the silicon, phosphorus and manganese contents of the iron.

All of these charcoal iron differentials to be considered in connection with the base price.

High Silicon or Silvery Iron

For iron containing:	Gross tons
6 per cent silicon.....	$8.00 above base
7 per cent silicon.....	10.00 above base
8 per cent silicon.....	12.50 above base
9 per cent silicon.....	14.50 above base
10 per cent silicon.....	17.00 above base

Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over.

Low Phosphorus Iron

Iron containing phosphorus and sulphur not exceeding 0.04 and silicon not exceeding 2 per cent.

	Above base
For copper free iron—copper not exceeding 0.04	$20.00
For copper bearing iron, copper not exceeding 0.25	19.00
For copper bearing iron, copper not exceeding 0.50	18.00
For copper bearing iron, copper over 0.50	17.00

A sliding scale of $1.50 per gross ton advance for each reduction in phosphorus of 0.005 per cent below 0.04 and $1.75 per gross ton advance for each 1 per cent silicon in excess of 2 per cent.

For iron with phosphorus over 0.04 use following scale:

	—Add to base price per gross ton—			
Phosphorus, maximum	Copper 0.04 maximum	Copper 0.25 maximum	Copper 0.50 maximum	Copper over 0.50
0.040	$20.00	$19.00	$18.00	$17.00
0.045	17.50	16.50	15.75	15.00
0.050	15.00	14.25	13.50	13.00
0.055	12.50	12.00	11.50	11.00
0.060	10.00	9.50	9.25	9.00
0.065	6.50	6.50	6.50	6.50
0.070	5.50	5.50	5.50	5.50
0.075	5.00	5.00	5.00	5.00
0.075-0.09	———(Use bessemer price)———			

Other extras and differentials on pig iron remain as shown in the institute pamphlet of January, 1918.

IRON AND STEEL SCRAP

All prices shown on pages 14-a, 14-b and 14-c, as being effective on and after Feb. 21, 1918, are reduced $1 per gross ton on and after April 1, 1918.

The committee approves of and announces rulings of the sub-committee on scrap iron and steel as follows:

Low phosphorus steel scrap may only be dealt in under Schedule 2 (a) when it consists of material specifically named therein.

Shell steel scrap, ship-plate shearings and all other low phosphorus scrap, 0.04 and under in phosphorus and sulphur, must be sold under Schedule 2 (b), maximum $36.50.

Schedule 2 (c) may not be abused by the shipment of melting steel scrap to an acid or electric furnace. It shall consist only of low-phosphorus material which will not analyze 0.04 and under in phosphorus and sulphur and must be of a character similar to the material specified therein.

Low phosphorus turnings, including shell steel turnings, may not be dealt in at any price in excess of that announced under Schedule 9.

Shell steel turnings may only be sold under Schedule 9 (b), maximum $24, when the heavy cuts have been separated to conform with that schedule.

No charge for shearing or otherwise preparing scrap may be added to any of the differentials announced.

FORGING INGOTS

To the differentials for size should be added the following:

Under 20 inches diameter, add to base price	$5.00
For chilled mold cast ingots over 10 feet long add to base price.....	5.00

STEEL BARS AND SMALL SHAPES

Extras for bands as shown on page 20 and for hoops as shown on page 22 of the institute pamphlet are canceled. Steel hoop extras shown on page 25, 26 and 27 are also canceled.

BOLTS, NUTS AND RIVETS

Cancel price on large rivets and ⅞ x 6 inches smaller and shorter rivets shown on

page 82 of institute pamphlet and substitute the following:

Large rivets:

Structural and ship.....	$4.40 base
Boiler	4.50 base

⅞ x 6 inches smaller and shorter rivets, 50-10 per cent.

No change in price on machine bolts, carriage bolts, nuts, etc., as shown on balance of page 82 of institute pamphlet.

CAST IRON WATER PIPE

Change base prices shown on page 84 of institute pamphlet to read as follows:

$55.00 f. o. b. Birmingham, Ala.
61.35 f. o. b. New York.
60.35 f. o. b. Chicago.

STEEL CASTINGS

Cancel differentials for alloy steel castings shown on page 91 of institute pamphlet and substitute the following:

Alloy Steel Castings

For nickel or other alloy castings an extra charge will be made based on amount of alloy and cost of same.

SHEETS

To the differentials and extras for forming as shown on page 42 of the institute pamphlet add, per 100 pounds, the following:

Beaded ceiling	25c
Weatherboard siding	25c
Rock face brick (and stone) siding.....	25c

To the notation in regard to lengths on page 42 of the institute pamphlet add the following, "Or shorter than 60 inches" so that the last sentence of the notation will read as follows, "Flat sheets extras will apply on lengths over 120 inches or shorter than 60 inches."

To miscellaneous extras shown on page 43 of the institute pamphlet add the following, per 100 pounds:

Army flange steel elastic limit not exject to physical test.....	25c
Army flange steel (elastic limit not exceeding 40,000 pounds per square inch	50c
Navy medium steel.....	10c
Carbon over 0.40 to 0.60.....	25c
Carbon over 0.60 to 0.90.....	40c

To the quantity differential at the bottom of page 44 of the institute pamphlet add the following:

"Commercial practice permits of a tonnage weight variation of 2½ per cent either way on gages 17 to 30 inclusive, and 5 per cent either way on gages 16 and heavier as produced by sheet or jobbing mills."

TIN PLATE

Tin and Terne Plate

Cancel the extras for charcoals for 107 pounds basis and over and substitute the following:

ADD FOR CHARCOALS

Basis lbs.	A	2A	3A	4A	5A	Premier
107	1.00	1.55	2.00	2.90	3.80	4.70
128	1.80	2.15	3.05	3.95	4.85	5.75
135	1.80	2.15	3.05	3.95	4.85	5.75
148	2.40	2.75	3.65	4.55	5.45	6.35
155	2.40	2.75	3.65	4.55	5.45	6.35
168	3.00	3.35	4.25	5.15	6.05	6.95
175	3.00	3.35	4.25	5.15	6.05	6.95
188	3.60	3.95	4.85	5.75	6.55	7.55
195	3.60	3.95	4.85	5.75	6.55	7.55

To the differentials for specialties shown at the bottom of page 45 add:

Sanitary can stock, add 10c base.

Cancel extras on ternes shown at bottom of page 46 of institute pamphlet and substitute the following:

Ternes

(Per package)

8 pounds—100 pounds	$15.00
8 pounds—IC	15.30
12 pounds—IC	17.00
15 pounds—IC	18.00
20 pounds—IC	19.60
25 pounds—IC	20.60
30 pounds—IC	21.75
35 pounds—IC	22.75
40 pounds—IC	24.00

WIRE PRODUCTS

Barbed Wire

Add following at bottom of page 62, "Painting other than standard color and quality subject to negotiation."

Wire Rope

Add after terms of sale on page 69 of institute pamphlet the following:

Agents Re-Sale Prices

An agent or dealer of a wire rope manufacturer, on shipments direct from the manufacturer to the consumer, will invoice at the established schedule of prices of the manufacturer.

An agent or dealer may charge the consumer an additional 5 per cent for the service of handling a reel of rope from his (agent's) stock, or 10 per cent in the event of his being obliged to cut a specified length of rope from his stock.

No agent or dealer should sell to another agent, dealer or broker without the proper assurances that the consumer, to whom the rope will eventually go, will not be charged on a higher basis than set forth in the first and second paragraphs hereof.

IRON BARS

The exceptions on page 31 of the institute pamphlet reading, "No extra charge for hot sawing or shearing to lengths of 5 feet and over," is canceled.

STEEL PLATES

To the extras for irregular sketches shown on page 34 of the institute pamphlet add the following:

"Sketch plates (other than those sheared to a radius) will be invoiced at actual weight of the sketch, at the base price, plus standard card extras (including sketch extras), with an additional charge for waste, if any, to be determined by deducting the actual weight of each sketch from the estimated table weight of the smallest rectangular plate from which said sketch can be secured, the difference to be invoiced at the rectangular plate price, less an allowance for the value as scrap, at the price fixed by the government for No. 1 heavy melting scrap."

COLD ROLLED STRIP STEEL

Cancel first sentence, second paragraph, page 75 institute pamphlet, and substitute the following:

"All prices for cold rolled strip steel are f.o.b. maker's works with actual freight allowed to destination when not in excess of 31c per 100 pounds."

HOT ROLLED STRIP STEEL

All prices and extras shown on page 78 of institute pamphlet are canceled and hot rolled strip steel of all qualities is shown on the new list of bands, hoops and hot rolled strips.

CHAIN

Base price and extras for iron and steel chain recommended by the committee on steel and steel products of the American Iron and Steel institute, May 21, 1918.

Base price for 1-inch common steel proof coil chain, self-colored or blacked, per 100 pounds, f.o.b. Pittsburgh, $7.50.

CHROME ORE

Chairman Gary, on the subject of chrome ore, issued the following statement:

As a result of an investigation in the trade, made by the subcommittee on ferroalloys of the American Iron and Steel institute, and of a meeting of the consumers of chrome ore for refractory purposes in steel manufacture, held at Pittsburgh on May 7, pursuant to call of the subcommittee on ferroalloys, and from other data available, the committee on steel and steel products recommends to the steel industry that it restrict the use of chrome ore for direct refractory use to a maximum of 1½ pounds per ton of open hearth ingots; that it purchase for the above purposes only domestic or Canadian ores containing not to exceed 38 per cent chromic oxide, nor more than 35 per cent chromic oxide as an average, each carload to be considered as a separate unit for analysis. The committee recommends that the use of chrome brick and chrome cement do not exceed the equivalent of a maximum of ½ pound chrome ore per ton of ingots. The committee urges that every effort be made to find substitutes for chrome ore for refractory use in open hearth steelmaking, with a view to effecting the maximum possible reduction in the use of chrome ore, without curtailing steel production.

The committee further recommends that producers or sellers of chrome ore restrict the sales of such ores for refractory purposes to the above mentioned maximum and average percentages of chromic oxide.

The stocks of foreign ores on hand together with those to be brought in during the year ending April 1, 1919, will not permit the use by the ferrochrome and chemical trades of a chrome ore mixture averaging higher than 45 per cent chromic oxide. The committee recommends that the ferrochrome and chemical trades begin at once the use of such mixture, acquiring promptly the domestic or Canadian ores necessary therefor.

This committee will consider the requests of any steel manufacturer whose special conditions seem to require a greater consumption of chrome ore than above recommended, when such requests are submitted through the subcommittee on ferroalloys and have received its approval.

The above recommendations are made because of the necessity for the maximum possible conservation of shipping, and the consequent need to utilize domestic and Canadian ores to the greatest extent possible.

The committee relies on the patriotism and good faith of the iron and steel, ferrochrome and chemical industry to accomplish this, and expresses the hope that all connected with those industries, as well as the producers and sellers of chrome ores, will co-operate in the proper spirit to this end.

Seeks Ferro and Spiegel

Pittsburgh, May 22.—A consumer south of the Ohio river has put out an inquiry in this district for 500 tons of 70 per cent ferromanganese and 500 tons of 16 per cent spiegeleisen for last half delivery.

An allotment of 70,000 tons of plates for new boats placed with the Skinner & Eddy Shipbuilding Corp., has been made to the Carnegie Steel Co.

Structural Awards Grow

April Lettings Raised to 64 Per Cent or 115,200 Tons—Ship Material Orders Held Up by Price Differences

New York, May 21.—The Bridge Builders' and Structural society reports that bookings by fabricating shops during April amounted to 64 per cent of capacity, or 115,200 tons. This compares with 84,600 tons in March and 99,900 tons in February. A comparative statement follows:

Month	Per cent	Approx. tonnage
April, 1918	64	115,200
March	47	84,600
February	55½	99,900
January	53	95,400
December, 1917	121	205,200
November	77	138,600
October	61½	110,700
September	29	52,200
August	38	68,400
July	41½	74,400
June	47½	85,500
May	56½	102,000
April	61	110,000
March	68	122,000
February	59	106,000
January	61½	119,000
December, 1916	86	148,000
November	78	134,000
October	77	133,500
September	52½	99,400
August	64	112,600
July	47½	83,600
June	58	100,000
May	80	137,000

Demand for bridge work and for miscellaneous government projects continues to make up the bulk of the activity in structural steel. Some small demands for railroad extensions are appearing but relatively little inquiry for this work is expected to develop before summer. The largest inquiry for railroad improvement is that for 2500 tons for the Baltimore & Ohio shops at Glenwood, Pa. Railroad bridge inquiries aggregate 1500 tons.

Shops Want Higher Prices

Philadelphia, May 21.—Price differences have held up the allotment of 140,000 tons of fabricated steel covering a recent new ship order of the American International Shipbuilding Corp. The Emergency Fleet corporation has wanted the fabricators to accept this business at the same prices as were accepted previously. The shops, however, all quoted higher prices on this lot than in their previous bids. The structural market in this district is featureless. Priority shape business is small.

Take Government Business Only

Pittsburgh, May 21.—Fabricators are taking government business only and can get steel for no other purpose. No further details are available regarding the plans of the government to build a fabricating shop. It is understood that work on the plant is to be started soon and that it will be rushed to completion so that additional fabricating capacity will be built to hasten the shipbuilding program. Nothing of an official character has developed with regard to the structural tonnage that will be required for the ordnance plant to be built on Neville island. Estimates vary from 30,000 to 100,000 tons. It is reported that the American Bridge Co. will do the fabricating work.

Small Contracts Placed

Chicago, May 21.—Occasional small tonnages of structural shapes are being placed in the west but for railroad and industrial purposes only. The largest tonnage during the past week involved 520 tons for four buildings for the Pan Motor Co., at St. Cloud, Minn. Other tonnages closed were small. Specifications continue to be received for material going to fabricating shops building parts for ships.

CONTRACTS AWARDED

Four new buildings for the Pan Motor Co., St. Cloud, Minn., 520 tons.

Girders and viaduct for the Western Pacific Railroad Co., at Altamont, Mont., 296 tons, to the Virginia Bridge & Iron Co.

Through plate girder and I-beam spans, Bridge No. 303, for the Great Northern Railway Co., at Lohmiller, Mont., 198 tons.

Four pier sheds, Norfolk, Va., for quartermasters department, 3100 tons, to American Bridge Co.

CONTRACTS PENDING

Shops for Baltimore & Ohio railroad, Glenwood, Pa., 2500 tons, bids being taken by Westinghouse, Church, Kerr & Co., New York.

Bridge work for the Pennsylvania railroad, 800 tons, bids being taken.

Bridge work for the New Jersey Central, 400 tons, bids being taken.

Bridge work for the Chesapeake & Ohio railroad, 300 tons, bids being taken.

Wire Nails

In Large Amount Required for Government Cars—Wire Allotted

New York, May 20.—About 30,000 kegs of wire nails, comprising 1200 to 1500 tons, will be required in connection with the government car program. It is expected that these will be allocated shortly and that the tonnage will be so placed that the various car builders will receive their nails from the nearest mill. A large amount of government wire business, involving wire rope, plain wire and nails is being placed right along. The larger portion is in direct government business. The total tonnage, although large, does not nearly equal the entire output of the mills, so that the latter are able to accept commercial wire tonnage unaccompanied by priority certificates. It is reported in the trade that the government is about ready to redistribute 50,000 tons of barbed wire for France, which it placed a few weeks ago and then cancelled.

Sell to Government Only

Pittsburgh, May 21.—Wiremakers are taking no new business for private users, except that occasionally they find small lots for this purpose which can be sold to regular customers without interfering with government work. Specifications are coming to mills but are being pared down to the minimum or are not being taken care of at all. Heavy demands are being made for nails by consumers who are engaged in government work.

Barbed Wire Allotted

Cleveland, May 21.—Large tonnages of barbed wire for export to the allies have been allotted to mills in this district. As a result, capacity in this line is engaged for about three months. It is believed some provision must soon be made to supply the farmers with barbed wire or fencing if increased acreage is to be sown. Shipments and business are being limited to essential needs. There is some talk that dealers in wire rope have been quoting higher than the maximum price.

Ore Movement Grows

Cleveland, May 21.—Lake vessels carrying iron ore are making good time. Delays at upper lake ports following the early rush of steamers have disappeared as the docks there are giving summer dispatch. Railroad car supply at lower lake ports is below the maximum necessary and some boats are being seriously delayed. Ore shipments this month will run more than a million tons above the May, 1917 figure, placing the movement up to June 1 well in advance of last year's total.

Small lots of ore continue to be sold. Allotment of ore on the basis of requirements is being given close attention. Railroad cars are being distributed in such a way as to adjust the supply to the needs of both the ore and coal trades. Coal shipments from the mines are rather light.

Industry To See Where It Stands

Joint Committee of Producers and Government Representatives, Named at Washington Conference, is Assembling Data on War Steel Requirements—Result Will Determine Future of Open Market—Will Shape Curtailment Policy

WASHINGTON, May 21.—The first definite and practical estimate of the maximum tonnage of steel likely to be placed with American mills by the United States and allied governments is to be determined by a special joint committee named by the war industries board and the steel and steel products committee of the American Iron and Steel institute at a conference here last Friday. Just when this estimate will be made is a matter of conjecture but the committee was instructed by Chairman Baruch of the war industries board to act and report as speedily as possible, and now is at work.

The committee is not to stop with ascertaining the war needs of the countries leagued against Germany and her allies, but is to inquire into the requirements of all steel consuming industries, to measure this tonnage in conjunction with the war orders against available mill capacities and to submit its findings and recommendations to the war industries board. This is preliminary to drastic curtailment steps which the board has under consideration and is to give to those steel manufacturers who pledged 100 per cent production for the government the first concrete idea of the meaning of that obligation.

Definite Needs Still Lacking

The meeting of the steelmakers with the government officials last week again emphasized and more forcibly so, that the government has asked the steel industry to give it all the steel it needs in preference to other consumers, but has not given a clear-cut idea of the extent of its own requirements. This situation, while meeting a ready response in the industry, was somewhat bewildering to both government and industry officials. The meeting was a sequel to the one in New York a fortnight earlier and resulted in the plan to allow representative steel men as well as chosen government agents to find out what the government really wants.

The war industries board last Friday was frankly told that the steel industry had been trying to find out for months just what the United States and the allies will require the mills to produce. The board, as in the case of the New York meeting, virtually asked the steel men what to do. At New York the answer was, "We'll give you all we've got and all we can get." Here the answer was, "We've promised you all we have, but tell us what you want." The latter is regarded generally as a franker statement to the government and a fairer one to all interested in production and consumption of steel.

Will Draw Essential Line

From the survey being made by this special committee, the war industries board, probably in another joint conference with representative steel manufacturers, will determine definitely the capacities to be reserved for American and allied war orders and those to be released for commercial production. Here is believed to hang the much mooted curtailment question which will be answered by a sharply drawn line between essential and nonessential industries with some plan for the distribution of such steel as may be the surplus above essential requirements.

Chairman Baruch and J. Leonard Replogle, member of the war industries board and director of steel supply, are of the opinion there isn't going to be a surplus, or at least that it will be so small that the government will have to supervise its allocation. The steel producers are of the opinion there is sufficient steel for all war requirements with a surplus which, with some slight curtailments, can be made to satisfy commercial needs. Which opinion will prove correct will depend upon the findings of this joint committee and, the manufacturers and war board officials agree, upon the service the fuel and railroad administrations will render.

It is said that the government's proposal to the steel industry virtually was "Increase your capacities, if you want to fill commercial orders." It was this attitude which forced the question of making known definitely the volume of government tonnage to be placed with the mills. As has been stated, the time in which the survey will be completed is a matter of conjecture, depending largely upon the frankness with which the army, the navy and the shipping board—and the allies, too—make their requirements known to the committee. Some are of the opinion this is going to be a difficult task, because daily developments on the western front frequently add new and unexpected details to the war program, requiring more steel of varying specifications.

The steel men who are on this special committee are James A. Farrell, president of the United States Steel Corp.; John A. Topping, chairman of the Republic Iron & Steel Co.; E. A. S. Clarke, president of the Lackawanna Steel Co.; Eugene G. Grace, president of the Bethlehem Steel Corp.; and H. G. Dalton, of Pickands, Mather & Co. The government will be represented by Director Replogle of the steel division; Judge Edwin B. Parker, priorities commissioner; Alexander Legge, chairman of the requirements committee, and Brig. Gen. Hugh L. Johnson, the newest member of the war industries board.

Representative Interests Present

These steel men attended the conference last Friday: Elbert H. Gary, chairman of the United States Steel Corp.; J. A. Burden, president of the Burden Iron Co.; A. F. Huston, president of the Lukens Steel Co.; Willis L. King, vice president of the Jones & Laughlin Steel Co.; L. E. Block, vice president of the Inland Steel Co., F. J. Hall, vice president of the Central Iron & Steel Co.; A. A. Fowler, Rogers, Brown & Co.; D. G. Kerr, vice president of the United States Steel Corp.; James B. Bonner, representing the American Iron and Steel institute in Washington; Louis H. Williard, assistant to Mr. Bonner, and the steel representatives on the joint committee.

Attending the conference for the government were the four men named on the committee and Chairman Baruch, Robert S. Brookings, Hugh Frayne, L. L. Summers, Jay C. McLauchlan, Paul Mackall, P. B. Noyes, George N. Peek, Rear Admiral F. F. Fletcher and H. P. Ingels, secretary of the board.

Northwest Steel Co., Portland, Oreg., has secured contract from the Emergency Fleet corporation for construction of eight additional 8800-ton steel ships.

Pushes Big Coke Expansion

Government Lends Financial Backing to Large Program of By-Product Extensions—Encourages Blast Furnace Building

WASHINGTON, May 21. — Governmental financial support is to be given to the construction of many additional by-product coke ovens at different locations. While formal details still are being shaped and are not ready for announcement, the report that 1500 will be the total number of ovens to be added is given credence in official circles. Along this line it is learned that the Laclede Gas Light Co., St. Louis, is to benefit in this manner through additions to be built to its present plant. Additional by-product ovens are to be built near Pittsburgh and Connellsville.

There is no official confirmation as yet to the report that the government also is to be an active factor in the construction of additional blast furnaces, although the subject has been under discussion. At the same time, it is known that the government is to finance the excess costs in building under present conditions, of some blast furnace projects which are ready to go ahead. A two-furnace blast furnace plant at St. Louis with the required by-product coke capacity and other equipment for a rounded-out plant, is one of the projects under consideration.

The government's financial backing of new coke ovens is to develop an increased supply of toluol and other explosives. Aid is to be given under war department capital expenditures division although this likely will be taken over by the war finance corporation. It is understood aid is to be given for the building of extensions to present plants rather than for erecting new ones as time and materials can be conserved considerably.

Coke shipments now are enroute to the Union Furnace at Ironton, O., and that stack will be blown in in a few days. It has been down since last November.

Becomes Page Head

B. Lissberger, of the firm of B. Lissberger & Co., Woolworth building, New York City, was recently elected to the position of president of the Page Steel & Wire Co., New York, Pittsburgh, Detroit and Chicago, whose works are at Monessen, Pa., and Adrian, Mich. Mr. Lissberger was appointed to succeed the late Austin Clement, of Chicago. He is interested in a large number of industrial plants for the manufacture of spelter, acid, brass and copper products and has been director and vice president of the Page company for several years.

Farrell Denies Report

With the statement that all of his time and energy are devoted to the production and delivery of steel for government requirements, President James A. Farrell, of the Steel Corporation, has denied the press dispatches that he had been called to Washington by the President to become director of operations of the United States shipping board.

Takes Over Steel Plant

Pittsburgh, May 22.—A syndicate in which the Universal Rolling Mill Co., Bridgeville, Pa., owns the controlling interest, has purchased the works of the Hussey-Binns Shovel Co., Charleroi, Pa., manufacturer of shovels. The consideration is said to have been $500,000 and covers entirely the investment of stockholders of the company which recently entered proceedings in voluntary receivership. All obligations also have been satisfied. The plant is producing and will be operated as a separate unit by the management of the Universal Rolling Mill Co. under the name of the Hussey-Binns Steel Co., of which the new president is Walter H. Baker, secretary and treasurer of the Universal company.

The Non-Ferrous Metals

Copper Lead Spelter Tin

	*Copper	†Spot Straits, tin	‡Lead, New York basis	Spelter St. Louis basis	**Aluminum	Spot antimony
May 15	23.50	.....	6.80	7.30	32.00	12.25
May 16	23.50	.....	6.85	7.30	32.00	12.12½
May 17	23.50	.....	6.90	7.30	32.00	12.25
May 20	23.50	.....	6.92½	7.30	32.00	12.25
May 21	23.50	.....	6.92½	7.30	32.00	12.00

*Government fixed maximum price for prime lake, electrolytic and casting copper, in ingots, pigs, slabs, etc., less than carloads, 24.67½c.
†No spot Straits tin offering.
‡Outside market, prompt shipment.
**Government fixed price for 98 to 99 per cent ingot aluminum in 50-ton lots; lots 15 to 50 tons, 32.10c; one to 15 tons, 32.20c.

New York, May 21.—While tin for spot delivery remains very scarce in the east, the market appears somewhat softer than a week ago. Spot Chinese No. 1 is now holding as low as $1.01 and it is believed that possibly this price could be shaded. The easier tone in tin is noted particularly in futures which may be attributed in part to reports that Banca tin shipments are to be resumed. Chinese for May shipment is holding today at 94c, New York, and 91c for June.

Spelter continued to maintain its strength during the past week, although trading was of smaller volume. Producers as a rule are quoting only for nearby delivery and are making no effort whatsoever to force metal upon the market. Prime western for prompt delivery is quoted at 7.25c to 7.37½c, St. Louis; June 7.37½c to 7.50c, and July 7.50c. Grade A spelter and sheet zinc prices as fixed by producers and the war industries board last Thursday and Friday are now before President Wilson for approval. It was recommended they be not changed. The government closed bids last Friday on 1000 tons of Grade C for the army, but as yet no announcement has been made as to prices involved. Brass special, which has been in greatly improved demand, is quoted 7.62½c to 7.75c, St. Louis. The war department has decided to accept 99.50 per cent metal, so that redistilling of prime western probably will strengthen the market.

Prices on lead have been tending upward under somewhat improved buying. Spot lead is being offered at prices ranging from 7.12½c to 7.50c, New York. Shipment metal is quoted in the outside market at 7.90c to 7.95c, New York, for prompt, May and June. The leading seller continues to quote 7c, New York.

Interest in the copper market is centered upon the meeting May 22 of producers and the war industries board, at which time it is expected that a price will be set for the next three months. It is the firm belief in several well informed quarters that at least an advance of three quarters of a cent will be made; however, nothing of a definite character will be known until after the meeting.

Antimony during the past week has been in small demand, with prices ranging from 12.12½c to 12.37½c, duty paid, New York, for spot delivery, but today the quotation is 12c.

The aluminum market is quiet and unchanged, with scrap now limited to 33c, while the actual market still remains under that.

The Influences of Surface Tension

The Hypothesis Has Been Proffered That Surface Tension Bears a Far-Reaching Influence on the Structure of Iron and Steel—Convincing Evidence Vindicates This Theory

BY F. C. THOMPSON

ATTEMPTS have been made to correlate the properties of metals, and in particular the elastic limit, with the effect of the surface tension which was supposed to act at the crystal boundaries. In view of the importance of the subject, and of the fundamental nature of some of the criticisms leveled against this hypothesis, it seems advisable to consolidate previous statements and to deal more fully with the questions which have been raised. As a result of present abnormal conditions no new experimental work has been carried out, although there are several directions in which investigation is required before full credence can be placed in the hypothesis tentatively proposed.

Does Surface Define Structure?

To the author the evidence available that surface can, and does, make its influence felt in defining the structure, and hence the properties of metals and alloys, appeared so overwhelmingly great that it was taken more or less for granted in the first paper. Since, however, no less an authority than Dr. Rosenhain was unable to believe that a surface tension of any appreciable magnitude could be expected between the crystalline phase and the intercrystalline amorphous modification, the author has in the present contribution reviewed the available evidence more fully, and extended it in several interesting directions.

The other main criticism of Dr. Rosenhain may perhaps be considered first, namely, that whether the surface tension hypothesis can be justified scientifically or not, it is unnecessary; the mere strength of the intercrystalline vitreous modification being sufficient to explain the whole of the phenomena.

So far as the explanation goes that fracture of a normal metal sedulously avoids the crystalline boundaries, passing by preference through the mass of the crytsalline grains, such a simple hypothesis may be sufficient. Immediately, however, this idea is used to explain more or less quantitatively the remarkable increase of elastic limit and of tensile strength imparted to a metal by an increase of the crystal boundaries. A single instance may be taken from the results previously recorded, which, however, is in full agreement with the results of general experience.

The maximum stress of the sample of iron containing 0.049 per cent carbon was in the annealed condition, 21.1 tons per square inch; and after normalizing, 21.8 tons. The small amount of Fe_3C being of the same amount and similarly distributed in each sample, the alteration of tensile strength must be attributed to the change in the crystalline size from 700 crystals per inch in the annealed state to 870 in the normalized. Now considering for simplicity the crystals to be squares in cross section, and the thickness of the films to be the mean of those of the iron and steel samples already calculated, that is, 1.5×10^{6} centimeters, the difference in the area of the cement in inch square test bars of the two samples would be $2(870-700) \times 1.5 \times 10^{6} \times 2.54$ square inches, or about 1.28×10^{9} square inches, which area, if the simple strength of the cement is to explain the increased maximum stress of the normal over the annealed sample of iron, has a strength of 0.7 ton. The cement must therefore be credited with a tensile strength of almost 550 tons per square inch. Since the corresponding value for crystalline iron is in the region of 20 tons per square inch this high value is improbable, and some other factor than the mere strength of the amorphous modification must be sought. If material of such properties existed at the boundaries it is to be expected that it would make its presence apparent as a raised cellular structure on a merely polished surface, as cementite often does when it occurs in this form. Further, a Turner sclerometer scratch fails to change its width on crossing the grain boundaries, which would certainly be expected, however thin the films might be, if they were possessed of such high tenacities as they would act as a breakwater, strengthening the soft material in their immediate neighborhood. Surface tension supplies at once a plausible and, so far as the author can see, almost the only possible alternative to this simpler but insufficient view, that all that is required is that the intercrystalline films be "stronger per unit of area than the crystalline material."

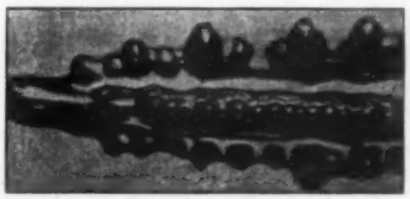


FIG. 1 — DENDRITE OF LEAD WITHDRAWN FROM RESIDUAL LIQUOR DURING SOLIDIFICATION

Explanation Not Complete

This is, however, by no means all. It is not quite easy to see why the mere existence of a hard modification between the crystals should cause the latter to adhere at all. At any rate it affords no obvious explanation why the boundaries become the strongest part of the mass. The most that can be expected if two surfaces of a material are to be kept in contact by simple adhesion is that the union should be nearly as strong as the cohesion of the material itself. It is unthinkable that under such conditions the masses should be brought together so closely as to adhere more strongly than do the molecules lying on adjacent cleavage planes. There is further no reason to believe that the mere introduction between the crystals of another and harder material would increase the strength of the attraction of these crystals for each other, in fact direct experimental evidence is available in opposition to such a view. Bismuth is distinctly harder than pure gold, and yet the introduction to the latter of a trace of the former, practically the whole of which is found between the crystals of gold, renders the intercrystalline strength almost non-existent, the alloy being intensely brittle, devoid of ductility, and breaking with an intergranular fracture.

We are therefore again forced to the conclusion that the hypothesis of a hard intercrystalline cement is not sufficient to explain by any means all the phenomena which must be taken into account, and that a consideration of the possibilities of the surface tension hypothesis of intercrystalline strength is by no means unnecessary.

In much the same direction lies the weakness of Prof. Howe's criticism, and

This paper was presented at a recent meeting of the British Iron and Steel institute.

of his attempt to explain the remarkable strength of the crystal boundaries simply by the change in direction of the gliding planes upon which slip occurs on passing from one crystal to the next. Such a viewpoint is sufficient to explain several important facts, as, for instance, the increased resistance of the metal to the commencement of plastic deformation as the crystals become smaller, a fact which shows that empirically the elastic limit is proportional to $n^{1/2}T$ where n is the number of crystals per unit length. Some defects of this hypothesis of Prof. Howe's, however, lie firstly in the fact that again no explanation whatever is given as to why the crystals do not fall apart under even the smallest stress, and secondly in the failure to account for the perfectly definite dependence of the elastic limit of the metal upon its surface tension, a relationship abundantly shown in Fig. 3. The curve alone appears to the author to demonstrate beyond doubt the fact that the surface tension of a ma-

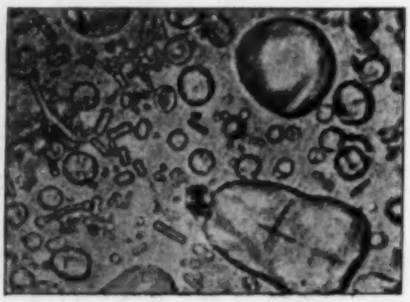


FIG. 2—CRYSTALS OF PARAAZOXYANISOL

terial is one of the factors which determines its elastic limit, and an exceedingly important one at that.

In this connection, since it also satisfies Prof. Howe's second criticism, we may perhaps consider very briefly the reason for the dependence of the elastic limit upon the size of the crystals, when theoretically:

$$E = \frac{2T}{d}$$

where E is the elastic limit,
T is the surface tension,
and d is the thickness of the amorphous films,

a formula which does not involve a function depending upon the crystalline size. As Prof. Howe has pointed out, the cutting in two of a wooden bar, and the gluing together of the pieces again with an infinitely strong cement, does not increase its strength, since when broken the fracture finds another path. The analogy appears, however, to be somewhat defective when a crystalline aggregate such as a normal metal is considered. A truer one would be a criss-cross scaffolding, when the increased strength which accompanies a smaller lattice is readily understood. Such a picture does offer a true comparison, since on all crystal boundaries, except those parallel to the direction of an impressed force, there is found a resolved part of the surface tension attraction equal to $\frac{2T}{d}\cos\theta$, where θ is the angle between the boundary and the direction of the force. A tensile strength therefore may be assumed in each of the members of the scaffold, and hence in the scaffolding itself, which latter will become stronger and stronger as the number of poles forming it increases.

Relation of Density to Tension

Having thus seen that some such additional factor as surface tension is required in a presentation of an explanation of all the facts concerning the strength of aggregates of metallic crystals, we may proceed to a consideration of the objection raised that a surface tension of any magnitude cannot be expected between a crystal and the amorphous form of the same material, since the density of the two are almost the same. That difference of density is not the chief cause in determining the magnitude of an interfacial tension, is readily seen from the fact that at 20 degrees Cent. the interface tension of water and olive oil, the density of which is 0.914, is 20.56, a high value for such substances as oil, despite a density difference of only 0.086.

There are, however, abundant proofs that a surface tension of high order is found between the crystalline and amorphous modification of the same pure substance, and the following three examples chosen from several available ones may suffice.

Examples Offered as Proofs

Fig. 1 illustrates dendrite of lead withdrawn from the residual liquor during solidification. That surface tension between this and the liquid metal at the same temperature has been at work is evidenced by the rounding off the angles. The conditions at the crystal boundaries in a solid metal are strictly analogous to those here obtaining, when an appreciable surface tension is equally to be assumed. Tin and aluminum are other metals in which rounded dendrites are formed.

The second justification is supplied by a study of the liquid crystals. In many of these, as has been shown time after time, the external crystalline form is obliterated by surface tension forces, and a more or less spheroidal one is assumed. This occurs when the drops are suspended in the non-crystalline liquid of the same composition, temperature, state of aggregation, and closely identical density. Fig. 2 shows such crystals of paraazoxyanisol. Le Chatelier has drawn attention to the close analogy which exists between the growth of the crystals in a metal during annealing, and the coalescence under surface tension of liquid or plastic crystals, as a result of the common tendency to attain that state with the minimum surface energy.

Further confirmation may be drawn from an entirely different direction. As the state of division of a substance becomes finer, and the amount of surface increases, effects due to surface tension become more and more striking. Thus as Ostwald and Hulett have shown, the solubility of a substance is dependent on the size of the particles, and the phenomenon has been used for measuring the surface tension of substances in the solid state. The values so determined for calcium and barium sulphates are 1100 and 4000 dynes per centimeter, respectively, which are of

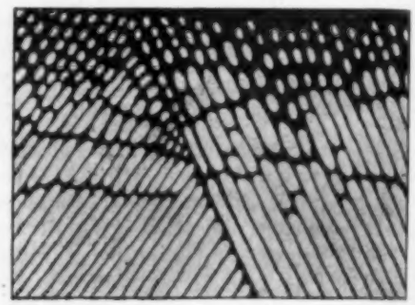


FIG. 3—ELASTIC LIMIT AND SURFACE TENSION ARE CLOSELY RELATED

great interest in showing the very high values of this constant in solids. For the solid metals, arguing from the very high value of the constant for liquid mercury compared with other liquids, the surface tension may be expected to be considerably higher still. It is, however, the effect of the surface tension of a solid upon the melting point which supplies the third proof of its effectiveness between the crystalline and non-crystalline forms of the same substance. It has been shown that granules of salol with a surface of 230–1300 μ^2 have a melting point 2.9 degrees Cent. lower than particles with a surface 100 times greater, that is, whose diameter is 10 times as great, a lowering produced by surface energy between the crystalline and non-crystalline.

The assumption of a surface tension in solid metals between the crystalline grains and the amorphous intercrystalline films is justifiable, nor is there reason to limit its value to a small magnitude. The criticism leveled against the surface tension theory of the elastic limit on that account, there-

fore, finds a completely satisfactory reply.

It now becomes of great interest to determine to what extent the application of the hypothesis to the more practical aspect of metallography yields valuable results. The complex changes which practically pure iron undergoes on recrystallization after cold work offer excellent scope for such an inquiry.

Work on this subject by Charpy, Le Chatelier, Sauveur and Chappell has resulted in elucidating the following facts: When iron is plastically deformed, by, for instance, pressure from a Brinell ball, though bending or other forms of stress yield corresponding results, and then annealed at temperatures from 650 degrees Cent. to 870 degrees

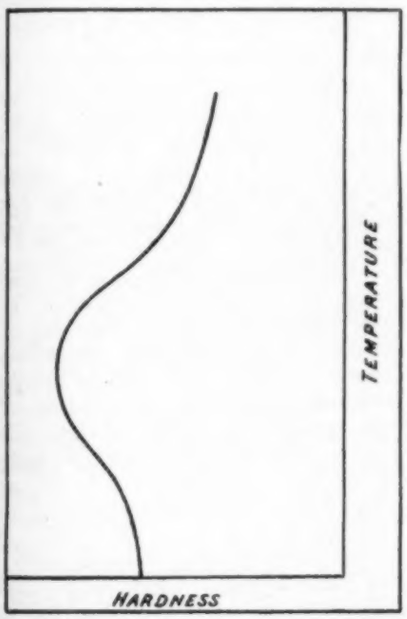


FIG. 4—THEORETICAL COURSE OF THE INFLUENCE OF TEMPERING UPON AUSTENITIC STEEL

Cent., a section cut through the center of the depression reveals three well-defined zones. In that nearest to the surface, in which the stress attained its maximum intensity, and in that farthest away, where the elastic limit was not reached, or but little surpassed, the size of the crystals is more or less unaltered. Between these two areas, however, an exceedingly coarse crystallization obtains, which is sharply localized where it comes against the least strained zone, but merges more gradually into the over-strained portion. This of course would not have been expected, it being reasonable to assume that any change induced by the deformation would be proportional to the distortion undergone.

Several explanations of the facts have been suggested, but since they are all, with the exception of that of Robin, insufficient and doubtful, they need not be considered here. The question is further complicated by the fact that, as shown by Chappell, recrystallization actually commences in the surface zone of greatest stress before it does in the middle one, in which, therefore, the rate of growth must be very greatly accelerated once it has commenced.

Action of Surface Tension Forces

Before proceeding to show that the application of the hypothesis of surface tension forces between a crystal and the surrounding vitreous modification is capable of reducing to order the whole series of results, it may be well briefly to recall a few fundamental facts regarding the action of such surface forces upon exceedingly small particles.

If a bubble of vapor of radius a is immersed in a liquid, the surface tension of which is T, the pressure within the bubble is greater than that outside by $\frac{2T}{a}$. For small values of a, this excess is very considerable, and on heating, the temperature must often be raised much above the boiling point before expansion of the bubbles can occur and the liquid boil. When this does happen, it does so suddenly and with violence, or, as it is usually termed, the liquid "bumps." The introduction to the liquid of a porous material containing air, by providing air-bells already of considerable size, eliminates this period of quiescence and normal boiling ensues. The converse process, the formation of drops of mist from a supersaturated gas, is equally important. In a dust-free atmosphere a high degree of supersaturation is required to produce a mist on account of the great tendency to evaporation of very small drops, another example of surface tension. Where, however, dust nuclei are present on the comparatively large surfaces of which dew can be formed, the production of mist is an easier process. In both these examples, it is in the case of the smallest globules when boiling or condensation is on the point of initiation that the inhibitive effects are so obvious. Once this stage is passed both proceed along more nearly normal lines.

Assumption Necessary

To apply these phenomena to the recrystallization of ferrite plastically deformed, one assumption only need be made, which, moreover, is so reasonable that it may be regarded as almost axiomatic. It is assumed that the effect of severe distortion in the cold is to reduce the originally crystalline aggregate to a debris of small remains of crystalline matter embedded in a vitreous matrix. This is of course is Beilby's view, and his diagram, Fig. 3, so exactly illustrates the condition that it is here reproduced. A less severe deformation of the mass results in a localization of the effects. There is no longer a uniform crushing, the disturbance occurring to the greatest extent in the neighborhood of the planes upon which motion has occurred, while there exist in between islands of unchanged crystalline matter which grow as the strain becomes less and less until they constitute the whole mass. This increase in size necessitates of course a corresponding decrease in their number.

On reheating such a deformed material the tendency is for the crystal islands to grow again at the expense of the vitreous portion. Now in ex-

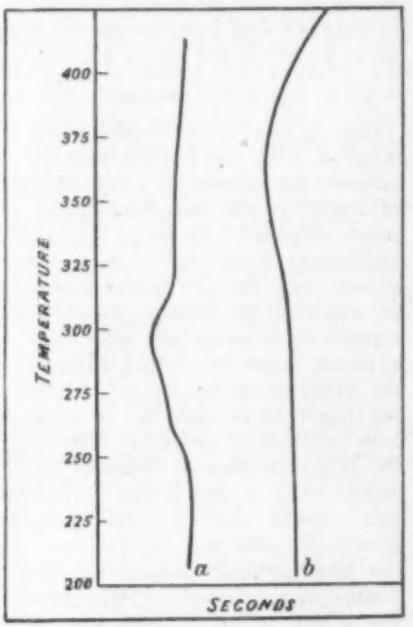


FIG. 5.—HEATING CURVES OF TWO STEELS DETERMINED BY (*a*) ARNOLD, AND (*b*) OSMOND

actly the same way that the liquid would not boil, that is, that small bubbles could not form and grow, and that the condensation of small drops of dew did not form in the supersaturated dust-free air, so it is reasonable to assume that the forces of surface energy prevent the growth of the smallest islands in the most severely deformed metal. Thus Chappell has shown that the disintegration of deformed ferrite crystals tends to occur at so low a temperature as 350 degrees Cent., as shown by markings which occur in the crystal on etching, but not until 500 degrees Cent. or over is reached is there visible change in the external boundaries or in newly recrystallized areas within the original crystals. When, however, this new crystalline growth from the crushed matrix does commence it proceeds with really remarkable rapidity, and at 570 degrees Cent. the crystal debris had

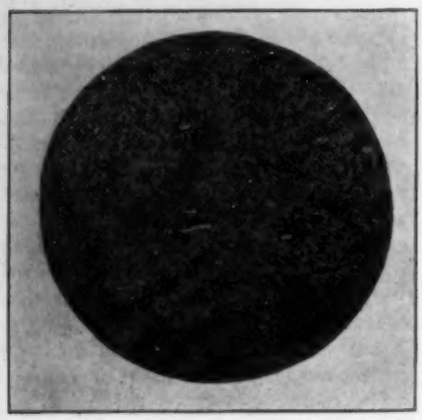


FIG. 6—MAGNIFIED 500 DIAMETERS

disappeared, a complete recrystallization having occurred, the new crystals henceforward growing steadily and normally up to the point Ac_3.

A Close Analogy

Now it may at first sight appear to many a very far-fetched analogy to compare this process of recrystallization of ferrite to the bumping of, for instance, sulphuric acid, but it is in reality exceedingly close, and since we have already seen that surface tension must be regarded as existing between the crystals in a metal, and since it is to a manifestation of surface energy that the irregular vaporization of the bumping liquid is certainly to be ascribed, both in its cause and in its effect, does the recrystallization of deformed ferrite appear to be a similar one. As Chappell remarks regarding the crystalline growth in deformed ferrite, once this has been initiated, "another conspicuous feature of the growth of deformed ferrite crystal is the rapidity with which union takes place."

Having thus seen that the hypothesis of surface tension between the crystals of a metal does afford an adequate explanation of the general conditions of

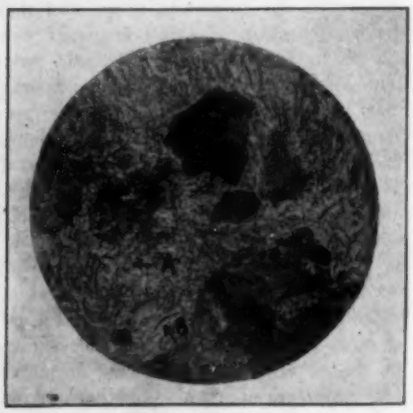


FIG. 7—*A*, COALESCENCE CEMENTITE GLOBULES UNDER SURFACE TENSION — *B*, BREAKUP OF Fe_3C PLATES UNDER SURFACE TENSION

crystalline growth when the plastically deformed mass is annealed, we may apply it further to explain the remarkable coarse structure produced as a result of reheating to 650 to 900 degrees Cent. after certain stresses. It has been abundantly proved that the recrystallization of a cold-worked metal does not occur by a simultaneous recrystallization throughout the mass, but by the growth of certain isolated grains specially favored. A satisfactory explanation of the reason that certain nuclei receive a preferential treatment will afford the key to the complex phenomena now to be considered. We have already seen that one of the effects of surface tension in iron is to prevent the growth of very small crystals—since it is in these that its action is most powerful—until at any rate a temperature is reached much above that at which it would otherwise commence. Further, the size of the crystal islets influences the result appreciably. Just as the solubility of calcium and barium sulphates, that is, the passage from crystalline to non-crystalline, increases as the particles become smaller, so does the tendency for growth of the ferrite remains decrease as they become smaller. It is, therefore, those ferrite particles of the greatest size which have survived the deformation which begin to grow again most rapidly when the minimum annealing temperature is reached. This has been realized for some time, but its essential dependence upon the forces of surface energy has not been so widely recognized.

Analysis of Phenomena

Now reverting to the fine superficial, the coarse-grained intermediate, and the unaltered most distant zones of the annealed Brinelled sample of iron, the first has its crystalline islets all very small and of more or less the same size. Thus, in the first place, the inhibitive effect of surface tension on recrystallization will be a maximum, while in addition the crystalline residues from which regrowth must start will be exceedingly small, very numerous, and of fairly constant size. The conditions, therefore, are all such as will result in a large number of small crystals on annealing. Passing on to regions less and less severely disturbed, islands will be retained which become gradually larger and larger, though around them along cleavage planes the finely committed crystal debris will be found as before. Such larger areas of crystalline material will, as we have already seen, grow preferentially, the matrix being deposited on them when recrystallization occurs. Hence, as they gradually increase in size, this fact of itself, and also as a result of their greater rarity and effectiveness as nuclei, will tend to produce crystals of gradually increasing dimensions in the annealed state. As we have seen, the passage from the small superficial crystals to those of the coarse band is gradual and not abrupt, which is as it should be on the surface tension hypothesis. Further, the smaller the strain to which the material has been subjected, provided of course that the yield point has been surpassed, the coarser will the structure of the annealed metal be. This, however, cannot go on indefinitely, since only when the elastic limit has been exceeded is there any debris along cleavage planes, and at the crystal boundaries, to cause crystal growth by their union with the unchanged parts. Hence from about the yield point another zone of essentially unaltered crystallization is found.

Explanation is Complete

A very complete explanation is thus afforded of the triple nature of the annealed structure, but the surface tension theory will carry the subject further and the influence of the temperature of annealing can be accurately predicted

At temperatures below a certain minimum the viscosity of the material will obviously preclude the possibility of any regrouping of parts. At higher temperatures, however, a point is reached at which the difference of solution pressure between the minute crystal remains of the crushed debris, and the larger unchanged crystalline islands will assume such a value that growth of the latter at the expense of the former will occur. This growth, however, will, in its earliest stage, occur only where conditions are most favorable, that is, where there remain a comparatively small number of crystalline parts of fair size embedded in a considerable quantity of crushed matrix. The coarse-grained material found after annealing is therefore strictly localized, and only material subjected to just such a stress as to yield this condition will show marked growth. Thus it is that Sauveur, using the low temperature of 650 degrees Cent., was led to postulate a critical stress as necessary to cause the coarse crystalline growth, only a very narrow margin separating material in the ideal condition for growth from that which is too slightly, or, on the other hand, too strongly deformed. As a higher annealing temperature is utilized, however, less favorable structures are rendered sufficiently mobile to reform and thus produce a grain growth, and regions stressed to a widely different extent take part, the critical stress disappearing, as Chappell showed beyond doubt.

The foregoing explanation, based on fully established facts regarding sur-

face tension, is quite independent of any special property of iron. It should therefore occur, if the hypothesis be true, that a corresponding coarse grain growth should be found under suitable conditions in other metals. That Robin has observed this in many metals and alloys is, therefore, exceedingly valuable confirmatory evidence. The explanation put forward by that investigator is exceedingly like that given here, lacking, however, the consideration of the effects of surface tension as operating in (*a*) retarding the commencement of growth in the over-strained part until a comparatively high temperature is reached, (*b*) in determining the influence of the size of the large crystalline residue, and (*c*) in determining the effect of the temperature of reheating.

This subject has been treated in great detail on account of the remarkable confirmation which it supplies to the fundamental idea that there does exist a surface tension between the grains of ferrite. It is inconceivable that if the basis idea were erroneous the conclusions arrived at should coincide so absolutely exactly even in the smaller details with experimental discoveries. The recrystallization of deformed iron is further an instance of great industrial importance in which the value of the theory is evident.

Effects of Surface Tension on Steel

Recent results obtained by Professor Howe on the coalescence of ferrite and cementite needles and cell walls into more rounded patches as a result of annealing have already been ascribed, with perfect justification as the author believes, to the influence of surface tension in tending to reduce the area of contact of the different phases present. Thus Prof. Howe remarks: "The network system is a transient arrangement. Surface tension is always striving to break it down, and in the end to assemble all the cementite in one mass and all the ferrite in another."

Sulphide inclusions in steel exhibit well the effect of surface tension in rounding their outlines so that in the cast state they are in general perfect spheres. From the point of view of the present paper, however, their effects in other directions are even more interesting. In the literature of metallurgical research terms such as "nucleus," "germ," etc., are exceedingly common. The influence of nuclei are often of paramount importance, but it does not appear to have occurred to many writers that their modus operandi is evidence of surface phenomena. It has been already noticed that it is often impossible for drops of liquid to form in a supersaturated, dust-free vapor on account of the profound influence of surface tension upon very small drops, while under ordinary conditions dust particles present offer an already considerable surface for condensation. In much the same way do nuclei facilitate by their presence the initial stages of the precipitation of the new phases. This fact has probably something to do with, for instance, the falling out of cementite from a supersaturated steel on cooling from above the cementite line at the crystalline boundaries, since here the impurities may be supposed chiefly to find lodging. The particular example of this influence of immiscible impurities which will here be considered is the effect of manganese sulphide and slag in determining the banded structure of, for instance, a boiler plate. When such a steel cools down to Ar^3 there is the tendency for the precipitation of ferrite. Now in the complete absence of all extraneous material the difficulty for the precipitation of the first particle of this of almost molecular size would be as a result of surface tension forces very great. The difficulty, however, is removed if there is available a surface already of appreciable size on which ferrite can be deposited. As Brearley has shown experimentally the sulphide or slag rods do afford such surface, with the result that around each such non-metallic inclusion a thick envelope of ferrite forms, leaving the spaces between to be filled up with pearlite. The banded structure of such a steel is thus absolutely determined by surface tension phenomenon, and affords another excellent illustration of the profound importance of this property of matter in its practical application. This explanation meets fully the objection raised by Prof. Howe to Mr. Brearley's interpretation of facts. Prof. Howe asks: "By what piping does this Pied Piper entice the ferrite from within the austenite, draw it across considerable distances, and enwrap itself in it as in a garment?" The ordinary course of diffusion together with the surface tension effects thus afford a complete answer to this question.

Effects of Tempering

The explanation of the properties of hardened steels and of the effect of tempering upon them in one direction in which it is obviously of interest to apply our hypothesis. As will be shown, it is capable of yielding exceedingly suggestive results and of explaining a wide range of facts without, moreover, resorting to assumptions such as that of interstrained iron made by McCance, or of the influences of crystal twinning of Profs. Carpenter and Edwards.

Perhaps the most direct way of approaching the subject is by considering some results contained in the paper on "The Magnetic and Mechanical Properties of Manganese Steel," by Sir Robert Hadfield and Prof. Hopkinson. Briefly it was there shown that the effects of reheating an "austentic" manganese steel was to render it increasingly magnetic, hard, and brittle.

FIG. 8—MAGNIFIED 500 DIAMETERS

The following table gives a few of the typical results obtained:

Treatment	Specific magnetism	Hardness No.	Angle of bend
W. T.	*	207	180†
400° Cent. for 6 hours	0.2	340	12
450° Cent. for 48 hours	7.0	418	1¼
500° Cent. for 60 hours	42.0	444	nil

*Non-magnetic.
†Unbroken.

A Duplex Constitution

It is now usually considered that in austenitic steels such as the manganese one under consideration, the carbon is in a state of perfect solution. Now there can be little doubt that the explanation of the structure of "hardenite" or "martensite" given by Prof. Arnold and Dr. McWilliam is correct. This explanation is based upon the well-known tendency for ferrite or cementite, as the case may be, to fall out of solution during even the most rapid quenching in the case of ordinary steel, especially upon the cleavage planes, which are therefore emphasized, and in certain cases give rise to the interlacing needle-like structure which by some has

FIG. 9—MAGNIFIED 500 DIAMETERS

been considered to be characteristic of this constituent. Without dwelling further upon the origin of the structure there is every reason to believe that it is no longer homogeneous as in austenite, but duplex with unaltered solid solution and precipitated ferrite or carbide microscopically beyond recognition. In Hadfield and Hopkinson's manganese steel a series of "interlacing lines" was noted in the reheated hard samples. Now such micrographic change, which form a homogeneous solution yields a duplex constitution, results in the formation of a most intimate series of boundaries at each of which surface tension must make itself felt, with the result that a strong scaffolding begins to strengthen the mass with a consequent increase of hardness. Further, this increase must be in some manner related to the extent of the micrographic change, or in other words, to the duration and temperature of the annealing, as the tabluated results clearly show.

The general hypothesis would also, however, suggest that the increase in the hardness produced by the reheating should not be without limit. When a more or less complete resolution of the "austenite" into its constituents has occurred and further annealing tends to produce coalescence of the already formed particles (the troostitic stage), the surface area between the constituents across which attraction can occur is a maximum, and thereafter decreases. Hence it should be possible to produce to a certain extent at any rate a softening by further heating beyond that point which yields the maximum hardness, a fact, however, which was not observed during the greatest time used.

Two other points arising from the work performed for this research are of interest. The explanation of the structure and properties of hardenite does not in any way depend, being physical and not chemical, on the actual chemical composition, and it is therefore of interest that in replying to the discussion on their paper the authors say "those figures suggested that the change in carbon did not appear to play an important part in the change in the quality of the material from non-magnetic to magnetic condition." Almost the same explanation is available in other cases than that of hardened steel to account for similar changes in properties due to the partial break-up of a solid solution as occurs in several of the copper alloys, for example, copper-aluminum.

The second point arises from the statement of Hadfield and Hopkinson, where "it was suggested that the important part in the treatment was probably the speed of cooling rather than the prolonged heating which preceded it." Such a result is entirely in accordance with, and indeed might have been deduced from, the surface tension hypothesis of the increase of hardness, since an annealing above the critical range, where no decomposition occurs, can yield no surface of separation at which surface tension can act. Further, as the extent of the decomposition of the solution increases with time, this factor is of vital importance in determining to what extent the necessary surfaces are produced.

It is necessary to add very little to the foregoing to explain the properties of an ordinary hardened carbon steel upon the same basis, since the same series of changes are undergone though at a greatly increased rate, and the influence of tempering may be equally readily understood. Starting with a steel in which the whole of the carbon is in complete solution, the form usually designated "austenitic," we have already followed the first change which results in a partial decomposition, hardenite being formed, with, as a result of attractions set up at each surface of separation, a greatly increased hardness. The hardness becomes a maximum under the theory when the greatest surface is present. A further tempering, however, producing growth in the products of the disintegration of the solution, reduces the maximum surface area and hence softens the material. In Fig. 4 is shown the theoretical course of the influence of tempering upon an austenitic steel which will be compared with the actual curve as soon as conditions allow.

Influence of Alloys

Passing on to a brief consideration of the influence of the presence of special elements in the steel, it was mentioned in the earlier paper that the refining influence of nickel, manganese, vanadium, tungsten, or chromium upon the structure of a steel was readily explicable on the assumption that surface tensions existed between each grain and crystal. That the growth of crystals upon annealing is the result of the tendency of such surface forces to diminish the areas across which they act is almost beyond doubt. It is a hypothesis which has been frequently used, and is merely a special instance of the general tendency of a system to assume the form with the minimum potential energy.

Now if the elements mentioned act as impurities often, though not invariably, do, and lower the surface tension between the crystals, then that very factor which actually determines growth is less effective, and for similar treatments the structure of the special steel will be finer than that of a plain carbon one. Since, further, the lowering of the surface tension increases as the quantity of the added "impurity" increases, the grain refining action will, within certain limits, increase with the amount of the special element present. At any rate in the case of the nickel steels this is an established fact.

It is, however, possible to follow the arguments in a further and exceedingly important direction. Not only does such a theory offer a rational explanation, so far as the author is aware for the first time, of the refinement of the crystalline size brought about by the addition of certain elements, but it indicates that the same additions, and for a similar reason, increases the resistance of the steel to tempering. In Fig. 5 are produced the heating curves of two steels determined respectively by (*a*) Arnold and (*b*) Osmond. Curve *a* was obtained on a hardened steel containing 0.89 per cent carbon and 0.09 per cent manganese, while the material on which curve *b* was determined contained 0.23 per cent manganese. The retardation produced by even 0.2 per cent of manganese on the evolution of heat which occurs when the velocity of tempering reaches an appreciable value is readily apparent.

There are two instances of immense practical importance in which this idea affords an absolutely new light. In the first case, as we have already seen, the effect of the special element which lowers the interfacial tensions in retarding the change and growth which accompany a tempering action increases as the quantity of that element is increased. We have also already seen that manganese, as far as it is at present possible to judge, exerts such an influence upon the surface tension. It is therefore reasonable to expect that where a sufficient content is present to exert its full influence no appreciable resolution will occur even on ordinary air cooling, or in metallographic terms the steel is austenitic. In both high nickel and high manganese steels this is found. That the explanation of the curious nature of the Hadfield manganese steel is due to such a slowing up, as distinct from a total suppression, of the change from the solution to the pearlite state is clearly shown by the fact that, as Hadfield and Hopkinson have shown, the Ar_1 point is still present about 674 degrees Cent. even with 12½ per cent of that element.

The Inland Steel Co. has placed a contract with Freyn & Co., engineers and contractors, Chicago, for a Brassert gas washer and dryer unit for No. 2 blast furnace at the Indiana Harbor plant.

Testing Efficiency of Gear Drives

Close Determination of the Efficiency of Gear Drives is Obtained by the Direct Measurement of the Loss of Power—Practical Application of the Method to a Bevel Gear Test

BY C. M. ALLEN AND F. W. ROYS

APPARATUS for determining the efficiency of gears and other drives recently has been developed and used for making tests in the mechanical engineering laboratories of the Worcester Polytechnic institute, Worcester, Mass. The fundamental principle of the apparatus embodies the direct measurement of the loss of power in the gear drive instead of determining the input and output and subtracting one from the other.

Since the efficiency of properly made geared drives is relatively high, the input and output are nearly equal, and any small errors in the measurement of these relatively large quantities will make a large per cent error in the difference, which is the power loss. It is therefore evident that a method by which the loss may be measured directly and independently of the input and output will be much more accurate.

Apparatus Used in the Tests

The apparatus which was used in the tests may be described as follows: An electric induction motor is hung in a cradle on double roller bearings, and an arm attached to the motor casing makes a cradle dynamometer. The motor shaft is connected directly to the drive shaft and an Alden dynamometer is put on the driven shaft. These dynamometers are so arranged that the force exerted by the end of the arms is downward. The arms of the dynamometers are of equal length and at the end of each is a fixed knife edge. A lever with three knife edges mounted upon it has the two outer knife edges adjusted so that the distance between them is equal to the horizontal distance between the dynamometer knife edges. The third knife edge divides this distance into segments whose ratio to each other is the same as the gear ratio. These three knife edges lie in the same straight line. The lever is now placed directly over the line between the dynamometer knife edges, and is supported by the third knife edge which rests on platform scales. The end knife edges of the lever are connected to the dynamometers in such a way that the high-speed dynamometer is connected to the long arm of the lever. A counterweight and a rider weight are mounted upon the lever. The layout of the apparatus is shown in Fig. 2.

The method of testing, so far as the operation of the lever system is concerned, is identical for all tests. The center of gravity of the Alden brake is nearly in the horizontal plane, so that a slight movement of the arm does not measurably affect its balance. The cradle dynamometer was so loaded that its center gravity was only a short distance below the shaft center, and a load of two pounds at the end of the arm was enough to entirely upset its equilibrium. The lever was then placed in position as described above and statically balanced by means of the counterweight shown in Fig. 2. A long pointer attached to the lever showed the position of the system relative to the initial condition of balance.

When the rider weight W was in its initial position, the load P_3 (Fig. 2) was noted as the initial reading of the platform scales.

The variables entering into the balance of this apparatus are then the forces P_1, P_2 and P_3, and the displacement of the rider weight. P_3 may be measured at any time while the apparatus is in operation, as also may the displacement of the rider weight. It should be noted that the amount of P_3 has nothing to do with the calculation of the power loss, which is found as follows:

It will be seen from the preceding description and from Fig. 2 that $P_1x = P_2y$ for 100 per cent efficiency; but since the efficiency is never 100 per cent, P_1x must exceed P_2y by the amount necessary to overcome the loss in moment. This difference immediately upsets the balance of the lever, of course, but equilibrium may again be restored by shifting the position of the rider weight in the proper direction. This displacement of the rider weight is therefore a measure of the change of moment, and when corrected for the speed of the apparatus it is a measure of the power loss.

Apparatus is Efficient

Here the input power is automatically balanced against the output, any change in the latter is immediately taken care of by the motor, and it is impossible for the apparatus to be out of balance except by the amount of the transmission loss. This is the feature of the method which distinguishes it. The power transmitted by the drive may be computed by noting the change in the load P_3 on the platform scales.

In operating it was found necessary to start the apparatus and let it run for several minutes before taking note of the initial position of the lever. The zero reading was frequently checked during the period of testing. The details of a test of a bevel-gear drive indicate the method.

Test of Bevel-Gear Drive

The gears were 5 per cent nickel steel, case-hardened, five pitch, 1½-inch face. They were cut by the Brown & Sharpe Mfg. Co., Providence, R. I., and were mounted on ball bearings especially designed for testing purposes. Following are the preliminary data employed:

Number of teeth in gear	52
Number of teeth in pinion	14
Ratio, 52 ÷ 14	3.714
Total length of lever between outside knife edges (see Fig. 1), feet	3.95
Length of long arm of lever, inches	37.344
Length of short arm of lever, inches	10.056
Length of dynamometer arms, inches	31.5

A force of two pounds at 31.5 inches is equivalent to 1-horsepower at 1000 revolutions per minute, for which the expression Z will be used.

Referring to Fig. 1, a force of 2 pounds at $P_1 = Z$. Therefore 2×37.344 = the inch-pounds of moment in lever necessary for Z, and if the rider weight is three pounds, then for this to balance Z, $3x$ must equal 2×37.344, whence $x = 24.893$, and therefore a movement of 24.893 inches of the rider is equivalent to Z for a three pound rider.

If the rider weighs but 1½ pounds, then the same displacement means only ½ Z. A paper scale was made according to these figures and was fastened to the lever. The readings for horsepower loss were taken from it throughout the test.

Referring to Fig. 1, since the initial load of P_3 was taken with the rider weight W already on the lever, a change in the position of W does not change P_3, but merely changes the moment. Therefore, in moment equations of the lever, regardless of where the center of moments is taken, the arm of the moment of W is always the distance from the zero position.

The force P_1 is a measure of the

Abstracted from a paper to be presented before the American Society of Mechanical Engineers at the spring meeting in Worcester, Mass., in June.

input power if the speed is known, and it is merely necessary to calculate this value in order to solve the problem Considering the moment equation of the lever, we have

$$0.838P_2 - 3.95P_1 + Wx = 0$$

whence

$$P_1 = \frac{0.838P_2 + Wx}{3.95}$$

If $W = 3$ pounds,

$$P_1 = 0.2122P_2 + 0.759x$$

if $W = 1.5$ pounds,

$$P_1 = 0.2122P_2 + 0.379x$$

x being the displacement of W measured in feet.

Referring to the accompanying table. for accuracy of recorded data the values in column 5 (x in feet) and column 10 (rider horsepower at 1000 revolutions per minute) should vary together, since they both refer to the displacement.

Column 10 is recorded for one purpose and read from the paper scale directly in horsepower at 1000 revolutions per minute, while column 5 is recorded for another purpose and the measurement is recorded in feet measured by an ordinary rule. It is necessary to read the values recorded in column 10 with as great accuracy as possible, but the approximate distance to the mean position as determined in column 10 is as close as it is necessary to record the values of column 5.

The values in column 10 after correction for speed give the total loss in power and become therefore the whole of the numerator of the equation for *loss* of efficiency, namely,

$$\text{Loss of efficiency} = \frac{\text{Horsepower loss}}{\text{Horsepower input}}$$

These values for horsepower loss are recorded to three significant figures, but the third is somewhat in doubt, and therefore the absolute accuracy is only through two significant figures.

In figuring horsepower imput it is necessary to use the value P_1, which is obtained by means of the equation $P_1 = 0.2122P_2 + 0.759x$, where x is the value in column 5. The maximum variation in feet from the mean position (column 10) is less than 0.1 feet,

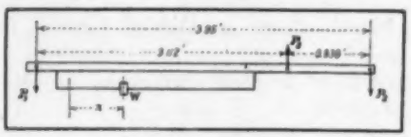


FIG. 1—DIMENSIONED SKETCH OF APPARATUS

but suppose that it was 0.1 foot; then column 5 might have been 1.8 instead of 1.7 as in the first recorded line.

To see what the effect of such a discrepancy would be, the following computations have been made, taking $x = 1.8$. and $x = 1.7$ respectively:

$P_2 = 200$; $0.2122\ P_2 = 42.44$

$P_1 = 42.44 + 0.759x$.

$= 42.44 + (0.759 \times 1.8)$ or $= 42.44 + (0.759 \times 1.7)$

$= 42.44 + 1.36$ or $= 42.44 + 1.29$

$= 43.80$ or 43.73.

As Z *input* $= \frac{1}{2} P_1$, then Z equals either 21.90 or 21.865, and

$$\frac{\text{Horsepower loss}}{\text{Horsepower input}} = \frac{\text{Rider horsepower at 1000 revolutions per minute}}{\text{Input horsepower at 1000 revolutions per minute}}$$

whence

$$\text{Loss or efficiency} = \frac{0.746}{21.90} \text{ or } \frac{0.746}{21.865}$$

It is thus seen that, measuring as accurately as possible, the numerator is only accurate to the second place, the third being in doubt; and that the second place in the denominator is sure, and the third fairly sure, although considered in doubt. Therefore the denominator is as accurate as the numerator.

The numerator is as accurate as the apparatus will allow data to be read, and therefore the inaccuracy of the data of column 5 has no effect on the final accuracy of the work.

In Test No. 1, the data of which are given in the accompanying table, practically no lubrication was used, the gears having been washed off with gasoline. Previous to this there had been oil and graphite on the gears, and some of the graphite still remained on the teeth. However, after running for a while they were practically non-lubricated. The three pound rider had to be used in this case because of the amount of the friction loss, which was sufficient to cause the gears to heat considerably.

The table presented herewith gives only a few of the results actually obtained, for the apparatus was started time after time and the balance by the rider gave the same results repeatedly.

The next test was made to see how much the efficiency would be increased with good lubrication. Accordingly some heavy oil and flaked graphite were mixed and used as a lubricant. The efficiency was so much increased that the 1½ pound rider weight was sufficient, and again it was found that the same results were obtained time after time. Later, after the graphite and oil had become more perfectly blended, another test was made.

The efficiency curves for these three tests are all given in Fig. 3. The difference between the results of non-lubricated and lubricated conditions is clear. The test with the more perfect blending of the lubricant showed results identical with the previous one, except as indicated by the dash line at the end of the upper curve. This showed that the lubricant was not squeezed out from between the teeth at quite so low a pressure.

The form of the curves and the con-

Data of Efficiency Test of Bevel-Gear Drive

PRACTICALLY NO LUBRICATION

R. p. m. of motor	Scale pan, lb.	P_2 lb.	$0.2122\ P_2$	x ft.	$0.759\ x$	P_1	Input, Z	Input, actual Hp.	Rider Z	Hp. loss	Output, Hp.	Efficiency, per cent
1	2	3	4	5	6	7	8	9	10	11	12	13
1115	5	200	42.44	1.70	1.291	43.731	21.86	24.37	0.746	0.832	23.532	96.6
1112	5	200	42.44	1.70	1.291	43.731	21.86	24.37	0.810	0.903	23.467	96.3
1112	5	200	42.44	1.70	1.291	43.731	21.86	24.37	0.770	0.859	23.511	96.5
1112	5	200	42.44	1.70	1.291	43.731	21.86	24.37	0.820	0.914	23.456	96.3
1119	5	200	42.44	1.70	1.291	43.731	21.86	24.37	0.806	0.899	23.471	96.4
1146	4	160	33.95	1.25	0.949	34.899	17.45	19.92	0.660	0.753	19.167	96.2
1146	4	160	33.95	1.25	0.949	34.899	17.45	19.92	0.615	0.702	19.218	96.5
1141	4	160	33.95	1.25	0.949	34.899	17.45	19.92	0.620	0.708	19.212	96.4
1141	4	160	33.95	1.25	0.949	34.899	17.45	19.92	0.612	0.699	19.224	96.5
1138	4	160	33.95	1.25	0.949	34.899	17.45	19.92	0.610	0.696	19.224	96.5
1160	3	120	25.46	1.00	0.759	26.219	13.11	15.14	0.486	0.561	14.579	96.3
1150	3	120	25.46	1.00	0.759	26.219	13.11	15.14	0.490	0.566	14.574	96.2
1150	3	120	25.46	1.00	0.759	26.219	13.11	15.14	0.486	0.561	14.579	96.3
1150	3	120	25.46	1.00	0.759	26.219	13.11	15.14	0.484	0.559	14.581	96.3
1172	2	80	16.97	0.62	0.471	17.441	8.72	10.25	0.316	0.371	9.889	96.4
1172	2	80	16.97	0.62	0.471	17.441	8.72	10.25	0.310	0.364	9.886	96.4
1177	2	80	16.97	0.62	0.471	17.441	8.72	10.25	0.308	0.367	9.888	96.4
1196	1	40	8.49	0.40	0.337	8.827	4.42	5.26	0.196	0.234	5.026	95.35
1196	1	40	8.49	0.40	0.337	8.827	4.42	5.26	0.204	0.243	5.017	95.35
1190	1	40	8.49	0.40	0.337	8.827	4.42	5.26	0.204	0.243	5.017	95.35
1205	½	20	4.245	0.37	0.281	4.526	2.26	2.72	0.184	0.222	2.498	91.9
1205	½	20	4.245	0.37	0.281	4.526	2.26	2.72	0.184	0.222	2.498	91.9

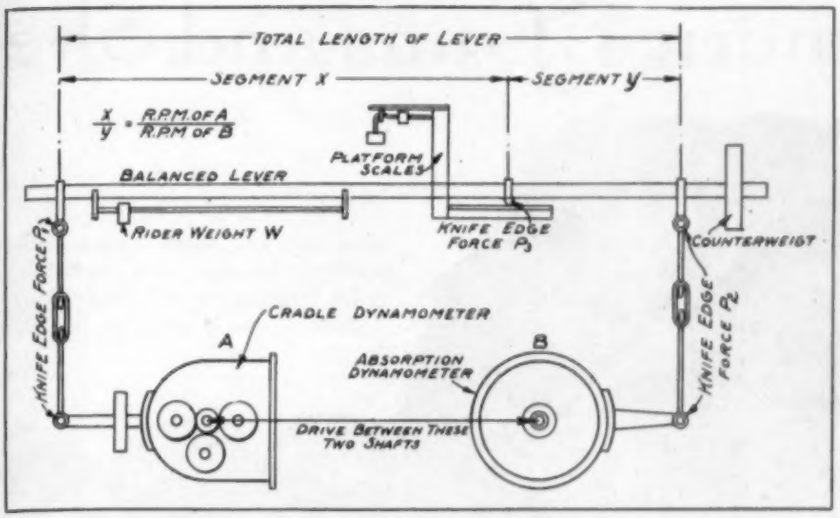


FIG. 2—GENERAL LAYOUT OF TESTING APPARATUS

sistency of the readings convinced the experimenters that reliable results had been obtained. It is accordingly concluded that this apparatus will measure accurately the efficiency of any positive shaft drive where both shafts are rotating at constant speed.

Finish Artillery Course

The training course for ordnance field service, which was started at the University of Pittsburgh last October and which was taken over by the war department in January, has been closed and the men under training have departed for Camp Hancock where all instruction in ordnance work has been centralized. Dr. J. T. Holdsworth, dean of the school of economics, has received a letter from Brig. Gen. W. S. Pierce, acting chief of ordnance, thanking him and the university for helping in training ordnance men. Lieut. John S. Keir has been in charge of the school.

Lets Oven Contract

The Citizens Gas Co., Indianapolis, has let a contract to the Wilputte Coke Oven Corp., 6 Church street, New York, for the construction of 40 Wilputte by-product coke ovens and erection of extensions to its existing by-product and benzol plant. Work has been started on the new plant and it is expected to be in operation by December, 1918.

Milwaukee to Build Ships

Steel, wooden and concrete ships are to be produced at a yard established in Milwaukee harbor by leading manufacturers and business men of that city. The Wisconsin Shipbuilding & Navigation Corp., with capital stock of $5,000,000, evenly divided into preferred and common shares, has been organized by Paul E. Thomas, president and general manager, Kempsmith Mfg. Co., Milwaukee, milling machines; Carl C. Joys, Vance & Joys, vessel agents; Alva P. Kletasch, Philip Schwab, George A. Schroeder, Paul Kremer, Dr. A. J. Puls, all of Milwaukee, and Frank W. McNeal, New York, marine engineer and constructor. Offices have been established at 831-832 Merchants & Manufacturers Bank building, Milwaukee. Government standards of construction will be followed and ships will be built for Atlantic service to pass through the Welland canal. Shops and berths will be built immediately and facilities will be arranged to lay two keels at one time. The company probably will take advantage of an offer by L. J. Petit and Fred Vogel Jr., leading bankers o Milwaukee, for the free use of a 20-acre tract of land along the Kinnickninnick river or the duration of the war. For the present the corporation's efforts will be confined to steel ships since fabrictaing and erecting shops are in the immediate neighborhood and now are shipping vessel parts to far distant points. Others interested in the new company are: Theodore Vilter, Charles Allis, William W. Allis, George Johnson, Johnson Lumber Co.; Albert O. Trostel, Louis W. Bunde, W. H. Upmeyer, Fred E. Turner, Adam Bloedel, Albert Vogel, Gerlinger Steel Casting Co.; John F. Knight, Cleveland., and H. J. Bawden, New York, engineer of the Terminal Panama Steamship Co.

Start Huge Warehouse

Work on the mammoth warehouse and terminal to be erected for the government in South Boston, commenced recently. Major Charles R. Gow, with a staff of assistants, supervises the work for the government, while the construction work, the contract for which was awarded the W. F. Kearns Co., is being carried on under the personal direction of General Superintendent H. L. Hemmingway. Capt. Henry C. Weare turned the first spade of earth April 29, in the presence of a number of government officials, including Major-General Goethals, acting quartermaster general.

Hamburg interests are contemplating the founding of a Company of International Enterprise similar to the American International Corp. The capital stock will be nearly $5,000,000 subject to increase later. The corporation will lend financial assistance to German enterprises in foreign countries, possibly owning some of them rather than promoting export trade. This is regarded as a move by Germany to re-establish herself in the commerce of the world after the war.

The Swedish Ballbearing Factory, Goteborg, is constructing a factory for the production of gear wheels of the kind invented by Engineer Erik Wingquist.

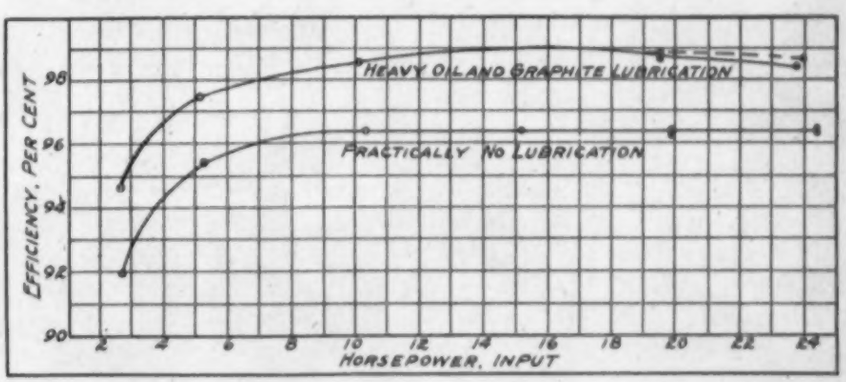
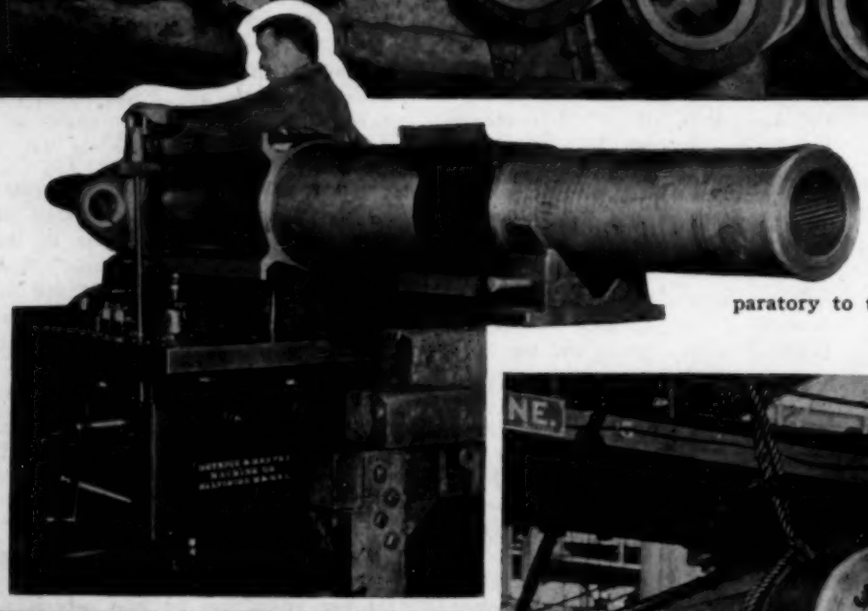


FIG. 3—HORSEPOWER-EFFICIENCY CURVES OF BEVEL-GEAR DRIVE

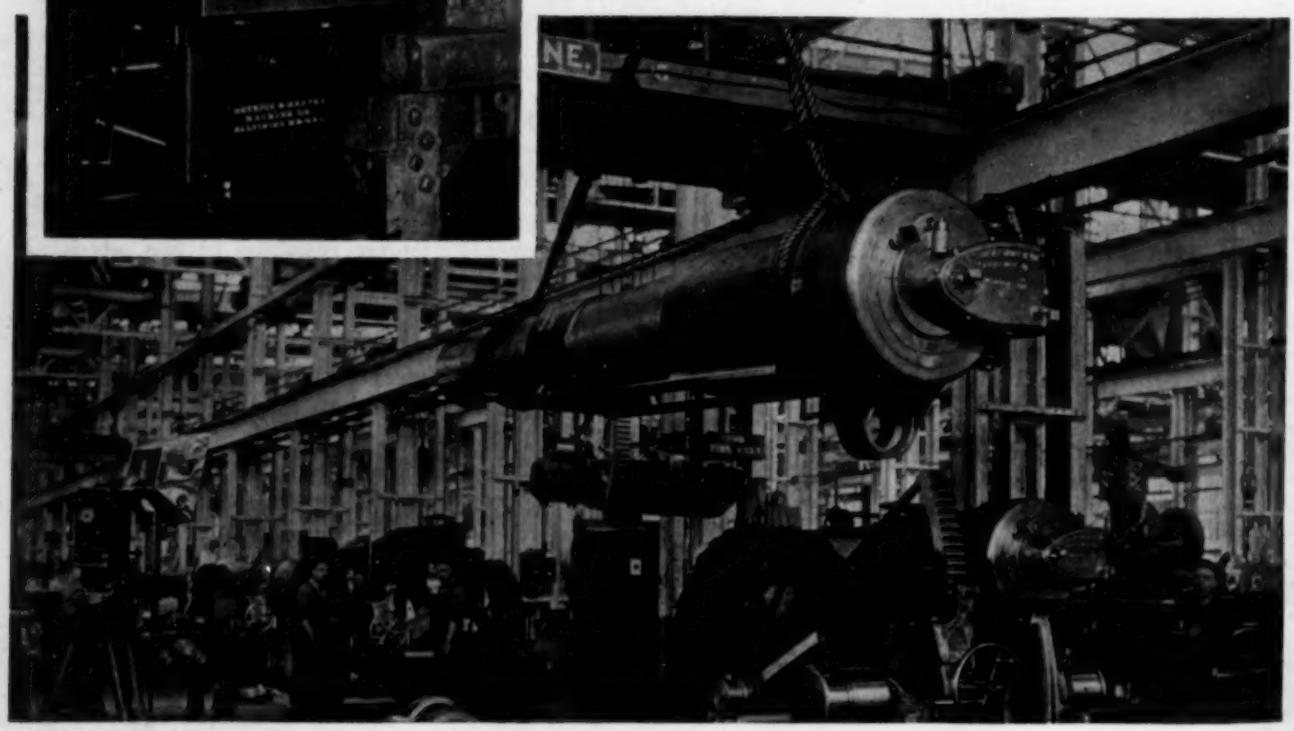
'Made in America' Guns and Shells

How the Midvale Steel and Ordnance Company is backing the men on the firing lines.

Eight-inch gun tubes, jacketed and awaiting the machining operations on the breech, outer surface and bore.

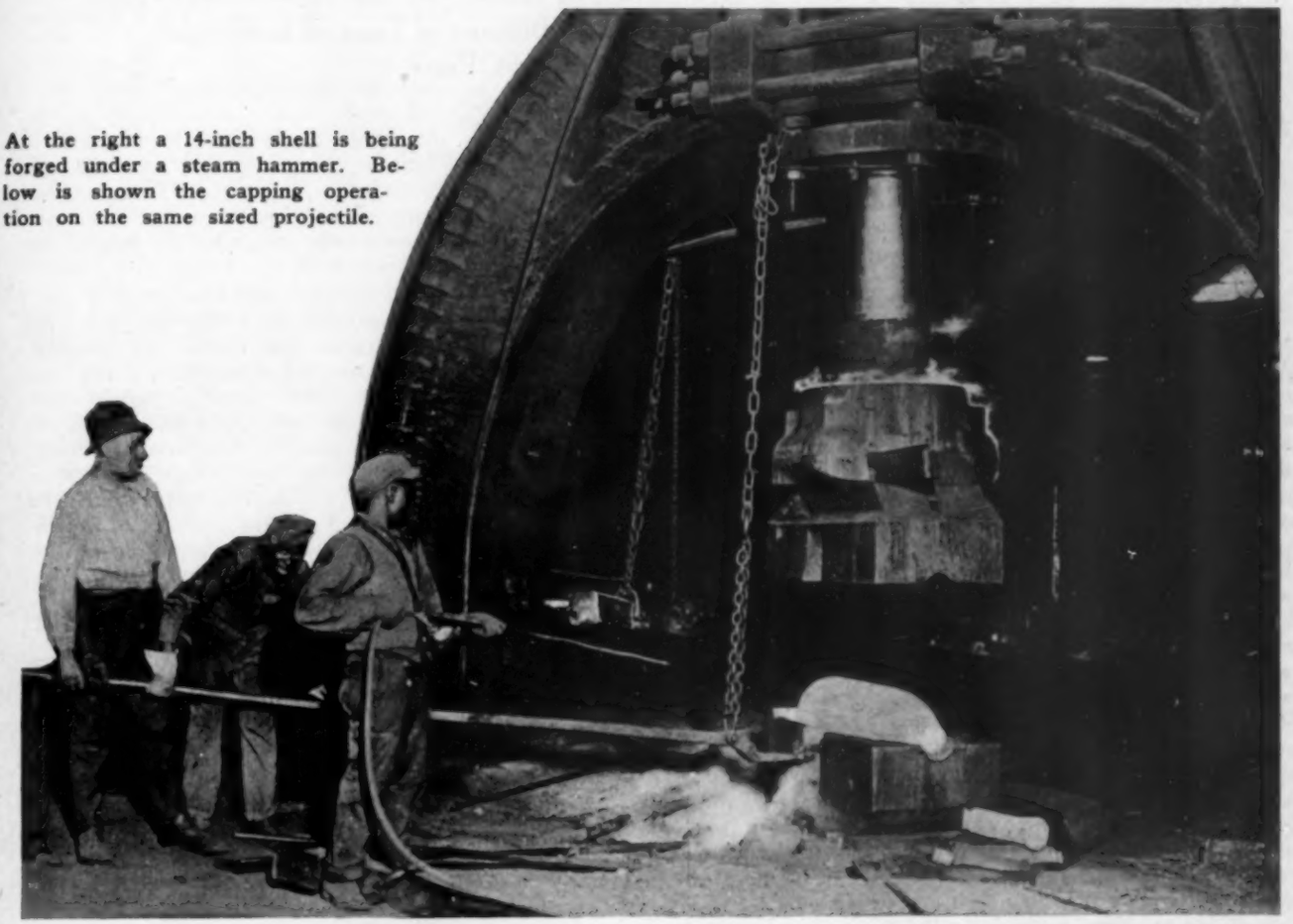


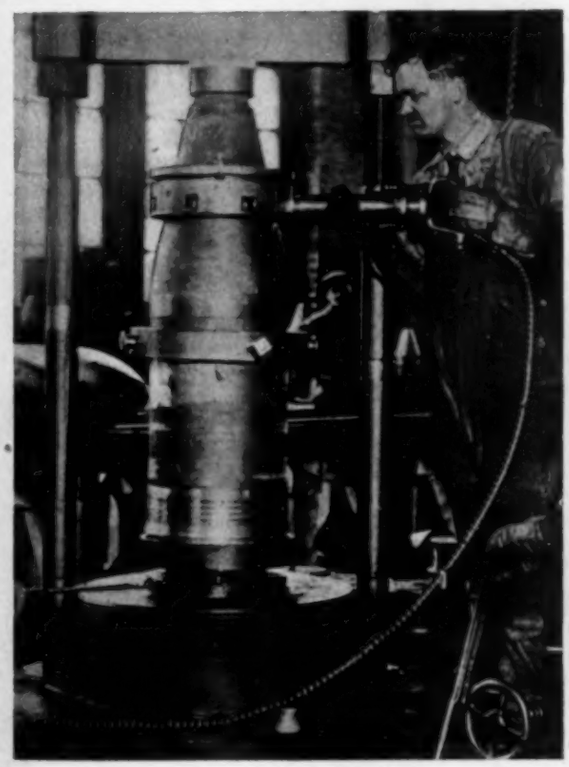
To the left is shown the threading operation on the breech end of the tube, while below a completed 8-inch gun is swung preparatory to the final assembling on the carriage.



ls Soon to Blast a Path to Germany

At the right a 14-inch shell is being forged under a steam hammer. Below is shown the capping operation on the same sized projectile.





Grinding and finishing the outer surface of a 14-inch projectile.

Released by the Committee on Public Information

German Wiles Gain Normandy Ore

Revelations of War Brings France to Realization of Harm—Its Native Mineral Wealth Was Exploited Against Its Own Safety—Billions of Tons of Iron Contained in Deposits Close by Paris

BY FRANCIS MILTOUN

Paris Correspondent of The Iron Trade Review

9 Rue Falguiere, Paris,
March 30, 1918

NORMANDY of the little cows is one of the most verdant, fertile fields of France. Its *sous-sol* is moreover lined with iron deposits of a vast extent. For centuries the local smiths, and farmers even, fused the ore and made a sort of home-made product in dribbling quantities ignoring its commercial possibilities. Then the Germans came and by insiduous means began to exploit the region, and the population round about was glad because of the money the operation put into local circulation. For every franc the German iron masters and mine exploiters put into circulation among the farmers of the cattle-grazing, butter and cheese-making districts of the old dukedom of Normandy they took a thousand back to Germany in their own ore boats from the ports of Caen and Ouistriham. It was all very subtle, and the French never paid attention or seemed to care, though they know now that this same iron by subtle processes of evolution has since been turned against their own plow shares in the form of German cannon.

Germans Made Initial Venture

The subterranean invasion of the boches into Normandy did not have the frankness of their operations in Lorraine where, as a result of the treaty of Frankfort, they shared the Briey and Longwy fields with France, rather the better and larger portion of it going to France. In the Orne and Calvados they went more slowly and less openly about their work, but the facts are out now, and it is time that they were made public throughout the metallurgical world.

This rich ore field in its first commercial development was purely a German venture. The French had forgot the traditions which had suggested that the sampling which had been done by their own people might be suggestive of a much more important development. The real exploitation of the region was just coming to its own when the war broke, though even then there were skeptics in the very region itself and in the iron trade circles of France. The Germans had even guarded the secret of their discoveries as to the extent and worth of these deposits and kept them for their own consumption.

Now France is coming to know herself. There are conservatively estimated 5,000,000,000 tons of excellent mineral almost immediately available, and to be had for the exploiting at a very moderate depth. This is the conservative estimate today and it may be greater as the German engineers Beyschlag and Krusch themselves estimated that the deposits would equal, if not exceed, 4,700,000,000 tons. Its average iron content is about 45 per cent. Thus it represents a theoritical holding of 2,250,000,000 tons of metallic iron lying almost at the very dooryard of Paris, and at least 250 miles from the frontier. It is practically free from any risk of invasion, whereas Briey and the Lorraine fields are today, as they have been since the first week of the war, still supplying German furnaces, at a cost of only that of the labor of extracting the ore.

In the five years previous to the war, powerful German firms had already planned for the complete absorption of these Norman iron deposits. Under the generic title of Gutthoffnungshutte was bound together the group of Krupp, through that of Thyssen. This German organization founded under French laws three mining companies—Société Miniere du Calvados, Société Française des Mines de Fer and the Societe des Mines et Carrières de Flamanville. At the same time, steps were taken to establish furnaces for smelting the ore on the spot and belching chimneys already had begun to punctuate the skies of the Parisians' favorite seaside playground of the summer months. It was a very efficiently organized scheme, and was destined to treat on the spot all possible operations—"all but the founding of cannon," says a French economist, one of the first to get his eyes open.

More German Intrigue

There was a well organized method in the consortium of the iron and steel trades of Germany to exploit these particular undeveloped fields of France. They evidently believed that the French were a troop of *gogos* who would fall for the fatuous appeal of a little cash spent in their midst, while the robbers were getting away with the bulk of the booty.

As early as 1910 three German companies were associated to carry the exploitation still further—the Phoenix, the Deutsch-Luxemburgisch and the Hoesch. They were to acquire and control the mines of Sainte André, the most famous of the Normandy group, coupled with those of Bully and Maltot. Looking for an intermediary in Paris they found a recently naturalized Frenchman, said to have acquired his nationality that he might act as stool-pigeon for this very purpose, who in his name bought the mine and organized a soi-disant French company, with a board of directors entirely French, but immediately after the organization all the shares were sold to the three German societies mentioned. It was then that Germany came to be the real master of the Norman iron fields, and by all possible means sought to relieve the French board of directors from all power of action, by compelling two of this board, Frenchmen above suspicion, to give their resignations whenever asked for.

French Are Duped

Chiefly these Frenchmen who were thus associated with the shady affair were naive local magnates, in some cases the landowners of the property on which the mines were located. Paid therefor in shares they were only too willing in most cases to turn them over to German purchasers to realize cash. This Societe des Mines de Saint André was thus able to shake off its French branches at the first opportunity in that the argument of cash for a director's shares was only to be made available for him upon his resignation, his forced resignation, no other. Germany then came to hold the cards and perform the functions of dealer. Uniquely it was German control and German capital and the product was solely destined for German uses, and this under the appearance of a company which in complexion and affiliations, and to a certain extent in personnel, was as French as the rich soil of the ancient provinces of old France which have furnished so much of natural *richesse* to one of the most

remarkable self-contained countries on earth.

Recently in the French press the cause of the development of these iron deposits of Normandy has found a champion in Leon Daudet, the editor of the *Action Francaise* and another in Maurice Barrés of the *French Academy*. The public, indifferent before, is now sitting up listening. Their efforts are worthy to rank with those of Engeurand on behalf of the recovery of the Basin of Briey. No more shall the *sous-sol* of France be exploited for the hegemony of the metal industries of Germany. There was a mystery of Briey as there was a mystery of Normandy, but the two seem apparently cleaned up once for all.

In all this time since the question of the Lorraine fields has been discussed as a war issue there has been but one sad note uttered in all the French press and that was by one Max Hoschiller. He has delivered himself of various screeds in one of the most conservative of French newspapers to the effect that the Germans have no need of the iron ores of Lorraine. No one seems to know what he means by this, nor can they follow his argument, but the fact shows plainly the underflow of current which metallurgy is playing in the great political and war game of Europe which to us in America can only be fully understood by coming at once to a realization of the prime necessity of the industry in the regime of peace to come.

"The Legend of the Basin of Briey" was an extraordinary phamphlet which should have been suppressed before its Russo-Austrian author had had the temerity to inflict himself upon the French public as a supposed authority. It is only fair to say, that neither in the *"Temps,"* in which his articles first appeared, nor in the *"Revue de Paris,"* are the arguments being longer presented, and it is the one big idea of all the French people today that the exploitation of their soil, whether above ground or below ground, belongs in the future to the French and the French alone. It is quite probable that they are right, for unquestionably the whole matter of international property rights is one which will undergo immediate revision as a result of the world war which has been inflicted upon us by Germany in an effort to impress its supreme will on the rest of the world who certainly does not need it—America and France least of all.

British Steel at High Mark

GREAT BRITAIN'S steel production in 1917 did not quite reach the 10,000,000-ton mark. But it was the largest in history by considerable margin. The total output of ingots and castings exclusive of crucible steel was 9,752,328 tons compared with 9,196,457 tons in 1916, an increase of 555,868 tons. Almost four-fifths of this gain was in basic open-hearth steel. The production of electric ingots and castings also showed a large proportionate increase reflecting the stimulus given to this branch of manufacture by the war demands for high grade material. Dr. Addison, formerly the minister of munitions, in an address before the house of commons, June 28, 1917, anticipated the year's increase in production when he stated that the total capacity had been increased to not quite 10,000,000 tons annually. He then stated that he would be greatly disappointed that if it did not reach 12,000,000 tons by the end of 1918.

Pig iron production in Great Britain in 1917 was enlarged by a fair margin over 1916 but still is considerably below its record for the years immediately preceding the war. The 1917 output of all grades including ferromanganese, spiegeleisen, ferrosilicon, etc., and direct iron castings was 9,420,254 tons. This represents an increase of 372,271 tons over 1914 when the total stood at 9,047,983 tons. It is however considerably less than the 1913 figure of 10,260,315 tons. The striking exhibit of the 1917 report is the sharp increase in the production of basic iron which corresponds to the growth of basic open-hearth steel manufacture. Foundry iron dropped off appreciably in 1917 from the preceding years. The statistics on the production of pig iron and steel for 1917 and for the preceding years is given in the accompanying table.

Electrical Society Visits McDonald Plant

A joint session of the Pittsburgh and Cleveland district sections of the Association of Iron and Steel Electrical Engineers was held May 18 at Youngstown, O., and was in the nature of an inspection trip to the McDonald and Ohio works of the Carnegie Steel Co. The McDonald plant is recognized as an important example of how efficient organization and co-operation assisted by executive administration may succeed in building up one of the largest and most modern steel mills of the day. Included in this plant are the following features: Six 8000 kilovolt amperes, 25 cycle, single phase, 4400-6600 volts, self-cooled, step down transformers, the largest of this type ever built.

The next meeting of the Cleveland district section will be held at Hotel Statler on May 25 when A. E. Hogrebe will give a talk on cranes. A special feature will be the dedication of a service flag. The next meeting of the Philadelphia section will be held on June 15 at Valley Forge.

Production of Pig Iron in 1917

District	Forge	Foundry	Basic	Hematite	Spiegel, Ferromanganese, ferrosilicon, etc.	Direct iron castings	Total
Cleveland	155,401	328,234	741,259*	700,518	89 201	9,686	2,563,143
Durham	1,635	3,636	538,754 848*	561,245	32,451	231	687,386
South and West Yorkshire	40,541	33,925	87,340 203,471	.....	.....	.....	308,237
Cumberland	.....	.....	.....	759,938	50,965	.....	810.903
Lancashire and North Wales	17,014	12 007	233,083	388,148	110.811	792	759,685
Scotland	43,329	202,922	63,335	868,441	13,296	118	1,211,432
Midlands: (Derby, Leicester, Northampton & Nottingham)	318 217	390.452	192,613	.....	.....	6,903	908,185
Lincolnshire	48,593	13,868	502.988	.....	.....	116	565,565
South Wales and Monmouth	621	193	74,532	717,084	.....	950	793,380
North Stafford and Shropshire	141,990	59,656	166,108	.....	.....	313	368,067
South Staffordshire, Worcestershire and Wiltshire	97,307	118,089	227,931	.....	.....	944	444,271
Total 1917	864,759	1,162,982	3,082,562	3,993,374	296,524	20,053	9.420.254
Total 1916	899,467	1,418,824	2,290,549	4,042 014	291,845	105.284	9,047,983
Total 1915	1,024,063	1,573,575	2,272 684	3,564,276	255,484	103,577	8,793,659
Total 1914	3,369,516		2,002,500	3,225,403	326,354	.....	8,923,773

*Cleveland iron, sent in molten condition to steel works.

Production of Steel in 1917

	Bessemer Acid	Bessemer Basic	Open hearth Acid	Open hearth Basic	Electric Ingots	Electric Castings	All other steel castings	Total (Excluding crucible steel)
1917	1,059 281	602,265	4.413,843	3,421,170	57,156	11.693	186,920	9.752 325
1916	1,096,153	505,817	4,393,004	3,012,558	39.968	9,288	139,669	9,196,457
1915	821,408	479,816	4,090,752	2,958,968	20,000	2,000	177,071	8,550,015*
1914	797,072	482,444	3,680.848	2,874,749	.....	.....	.....	7,835,113*

*Includes crucible steel.

Trade Combines Under Webb Law

Legal Authority Who Aided Materially in Work of Framing Measure Setting Aside Anti-Trust Regulations in Foreign Trade Discusses Practical Methods for Realizing Benefits of New Law

BY GILBERT H. MONTAGUE

THE most vitally important fact to get fixed in mind in connection with the Webb-Pomerene bill is that after two conditions are met, there is almost no limit to what may be done in pushing the sale of American goods in foreign markets and in meeting competition abroad. What are these two conditions? They are merely that nothing be done to affect trade at home, and that no unfair methods be used against some outside American competitor, who is also engaged in American export trade.

The Webb act is merely intended to permit, in the American export trade, certain legitimate methods and arrangements that otherwise might be held to be in violation of the antitrust laws.

After meeting the two conditions above mentioned, the law was purposely designed to permit of the utmost elasticity in organization and operation. For this reason, it is impossible to lay down any ironclad rule for the guidance of procedure under it. Each branch of industry will have its own particular problems.

The best solution in some given situation may be a corporation or a partnership, or a common selling agency, or a nonexclusive agency or an individual sales agency, or a simple contract or understanding. It may be an arrangement that includes an entire industry, or one that includes only a few concerns or one that is limited to a single concern. It may require the apportionment of orders, profits, losses, business and territory or agreement regarding prices. In fact as long as the two conditions are satisfied there is practically no restriction on what may be done.

Companies Must Be Registered

Some members of congress insisted for a long time on an elaborate machinery to keep detailed check on every move of the export company. They finally agreed to compromise on the registration idea, however, placing in the government's hands data from which it may investigate complaints. This record will detail the names and locations of the companies forming the export corporation and all the facts about the organization itself, including names of officers, etc.

Undoubtedly it would have been simpler had understandings and combinations for export trade been permitted without the formality in all cases of a distinct organization, but I do not believe this provision will occasion any injustice or bring about severe hardship. It is to the class including chiefly smaller manufacturers which have no established foreign trade that the Webb law will be the greatest boon. In the first place, manufacturers considering entering the export field and taking advantage of the provisions of the law should not at the beginning attempt to organize on too ambitious a scale.

In many industries, any effort to form enormous national combinations at the outset will be likely to prove disastrous. The most sensible, and to my mind the only logical policy, for many of the essential industries, would be for a few competitors in the same district to organize in their respective districts at first. After a time when the district organizations are working smoothly and successfully they might well then combine into one great central body.

GILBERT H. MONTAGUE, counsellor at law, New York City, has had much to do in an advisory capacity with the movement extending over several years which led up to the enactment of the Webb-Pomerene bill. He served as counsel for the special committee of the American Manufacturers Export association, which was appointed at the time the bill was introduced in congress. He professionally advised and represented the committee while the bill was under discussion before the various committees of congress. In this connection he co-operated with representatives of other commercial and trade organizations and consulted with them from time to time regarding the advantages of the bill with respect to their own export trade. Mr. Montague was presented by President Wilson with the pen by which the latter signed the bill in recognition of his efforts toward putting the measure on the statute books in practical form.

Procedure Is Outlined

In proceeding with the formation of an export corporation heads of competing concerns in their respective section of the country should first familiarize themselves with the provisions of the law, which in reality is by no means complex.

Then they should get together, and survey the export field from their viewpoint. Any number of avenues approaching the export field may suggest themselves as available. One must be chosen. How extensively they want to go into the export business must be decided upon as well as what market is to be gone after and in what particular part of the world. Then, too, the question of opening foreign branches, or whether established export houses should be employed in developing trade must be given consideration.

With respect to the export commission houses, some of them have taken a position of opposition to the Webb act because of fear that it would injure their business. On the contrary, it should help these houses. With their vast facilities spreading into every part of the globe, their export knowledge of foreign markets, and their control of shipping, I expect to see them largely employed by new export combinations.

In fact I should advise, in some situations, where a group of small companies without knowledge of foreign trade combined to enter the field, that

they take advantage of these commission houses' facilities at the beginning. Of course, when the company expands sufficiently to handle its own business abroad, it should do so. In case agreements are entered into with the commission houses care should be exercised not to contract agreements which would prevent breaking away in due time.

If it is decided to prosecute the foreign markets independently of the commission houses, it must not be forgotten that the export business is beset with the gravest difficulties. Combinations which fail to obtain the most highly trained and experienced men possible to get will be making a fatal mistake.

Perhaps the most common of all plans of organization for companies, not now in the export trade on a large scale, will be the formation of a corporation which will purchase the product of the component companies for export. However, this corporation need not purchase the product, it may merely represent the companies as an agent to handle their foreign trade or any other similar plan desired.

In a like manner the profits of this central company may be distributed on any plan, but one that seems likely to be popular is for the export organization to allot stock to the combined companies in proportion to the amount of product each company agrees to furnish.

Each company in the combination may be bound not to dispose of any part of its product for export in any manner save to the corporation.

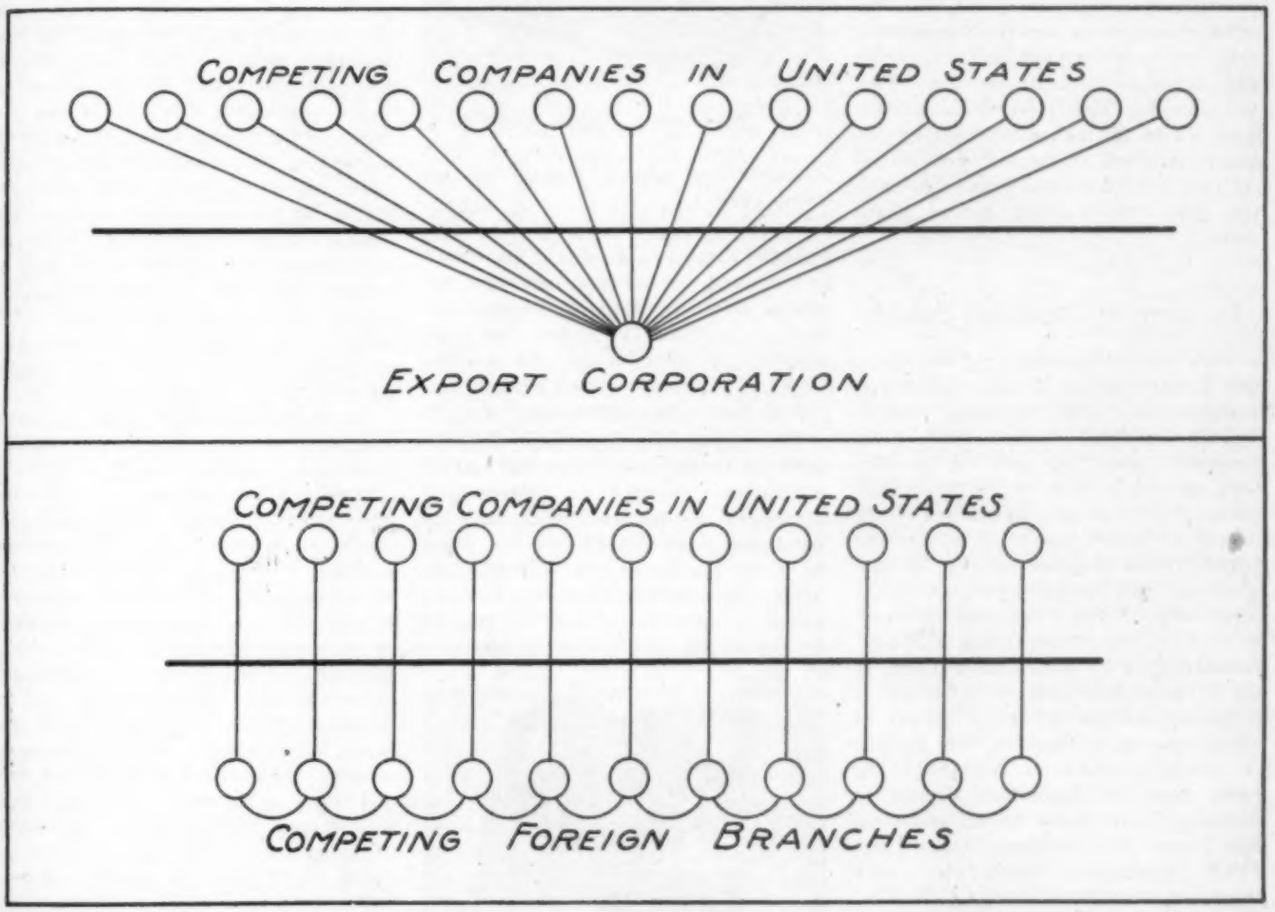
Extensive Sales Will Be Possible

Once the corporation is formed the companies may, as regards export trade, take broad steps to advance their export trade. The arrangements, under the law, may provide for the apportionment of orders, or price agreements and may be shaped and fashioned and changed according to the varying requirements of widely different exports in widely different markets and under widely different competitive conditions.

Many of the large manufacturing companies doing an extensive export trade have organized distinct companies to carry on this division of their business. These export branches of large corporations, provided they are solely engaged in export trade, may register in Washington within 60 days after the passage of the law and be in a position to take advantage of its provisions. Let us see how this might work out.

Take the agricultural machinery houses for instance. Suppose five large competing concerns were maintaining extensive sales branches in France or in Russia. Not only are these companies at an enormous expense in maintaining the foreign branches, but they are competing among themselves as well as against companies of the other countries.

If an understanding were entered into between these companies, whereby the branches should be merged or a price understanding and apportionment of territory be agreed on, these companies would be able successfully to compete with the great cartels of Germany and combinations of other nations, whereas now, in highly competitive nations, they are helpless.



TWO METHODS OF FORMING EXPORT TRADE COMBINATIONS UNDER WEBB-POMERENE LAW

Steel in Brazil

The first successful manufacture of commercial steel in Brazil was recently accomplished in the Engenho de Dentro works of the Central Railroad of Brazil, Rio de Janeiro. Native pig iron with a mixture of about 40 per cent scrap iron, without any steel scrap was used, a steel converter of 1-ton capacity being the melting unit employed. The native pig used, on analysis showed the following percentages: Silicon, 1.645; carbon, 3.50; phosphorus, 0.09; manganese, 1; sulphur, 0.02.

Stand Supports Stock in Cutting

An adjustable stock support which is used wherever long-bar stock, pipe, tubing, etc., must be supported has been placed on the market by the A. F. Way Co., Inc., Hartford, Conn. The support is shown in the accompanying illustration and operates in conjunction with hack saws, screw machines, bolt cutters, pipe-threading machines, etc. The base of the support which is made of cast iron, flares out at the bottom and overcomes any tipping action. A threaded yoke mounted at the top supports a roll which is notched in the center and prevents the bar or pipe from sliding off. The yoke is adjustable from 22 to 30 inches, the adjustment being obtained by means of a screw. A lock nut is provided and prevents the yoke from moving out of alignment.

AN ADJUSTABLE STOCK SUPPORT.

Inspect Industrial South

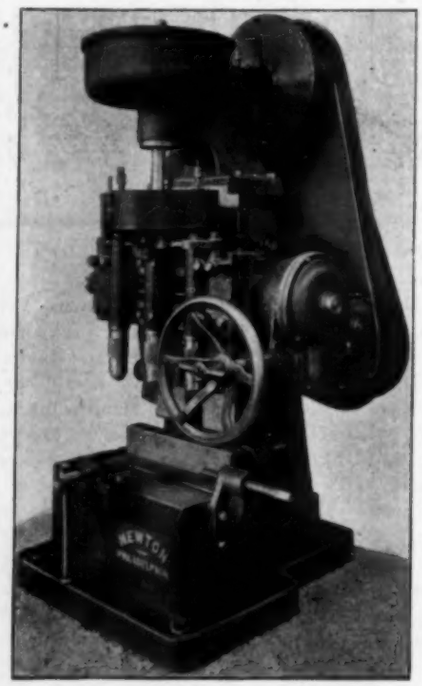
More than 150 members of the American Electrochemical society visited Birmingham and the immediate district recently on their southern trip. Local committees met the party in automobiles and took them to the blast furnaces, steel plant, by-product coke ovens, ore mines, water works, and the $20,000,000 development of the Tennessee Coal, Iron & Railroad Co.; to the wire mills of the American Steel & Wire Co.; and then through the residential section of the city. A dinner at the Tutwiler hotel was extended and a technical meeting followed, a feature of which was an address by Dr. Eugene A. Smith, geologist of Alabama. The party spent the day before coming to Birmingham at Muscle Shoals and from here went to Anniston, Ala., where electric furnaces, plants, etc., were inspected.

Drilling and Tapping Machine

The Langelier Mfg. Co., Providence, R. I., is building a single-spindle vertical drilling and tapping machine which embodies several novel features. The tapping spindle may be fed down by pressing on a foot treadle. Further feed may be secured through the treadle or through a hand lever. The machine has 4½-inch, tight-and-loose pulleys for a 1-inch belt. These are mounted on a horizontal shaft which also carries an idler and a tight pulley grooved for a ⅜-inch round belt. The shaft is mounted on a bracket which is adjustable to maintain the proper tension on the round belt.

A clutch is mounted between the spindle driving pulleys. This clutch is actuated by a snap fork and engages either forward or reverse pulleys. A depth stop on the yoke governs the time of the throw. The table is adjustable vertically and also has a radial movement.

For tapping large quantities of parts, such as stampings, where the pieces are to be clamped or jigged in a stationary fixture and where all the holes are to be tapped, are not likely to come exactly in the center of the work, an auxiliary flexible extension spindle is provided. This is gripped by the chuck on the regular machine tapping spindle which permits the tap readily finding its own center. This is said materially to reduce tap breakage. The machine will tap up to 3/16-inch diameter holes in steel and ¼-inch diameter holes in brass.



THREE-SPINDLE RAIL DRILLING MACHINE

Rail Drilling Machine

A new multiple-spindle rail-drilling machine has been developed by the Newton Machine Tool Works, Philadelphia. Its principle features are shown in the accompanying illustration. It is designed primarily for drilling simultaneously the three or four holes required in the ends of girder or other rails. The spindles operate separately and may readily be removed from the cross rail when desired. The spindle speed for heavy drilling is 125 revolutions per minute. Each spindle is 1⅞ inches in diameter. The minimum distance between spindle centers is 3½ inches and the maximum distance is 9 inches. The central spindle is stationary. The necessary adjustments, therefore, are made by moving the two outside spindles by means of hand-operated screws. The maximum clearance between the top of the table and the lower ends of the spindles is 19½ inches.

The work-table, which is 16 x 30 inches in size, is fitted with a slot in the top surface to hold the rails in position. The driving bearings are bronze bushed. The spindles, spindle gears and rack pinion are nickel steel. The gears are enclosed. The belt connecting the motor with the main driving pulley also is fully covered. The motor is mounted on a bracket on the left side of the machine. The power is transmitted from the main driving pulley to the spindles through bevel gears and spur gears. The saddle, which is counterweighted, is provided with vertical feed and hand adjustment. Vertical feeds of 0.04 and 0.007 inches per revolution of spindle are available. The driving pulley is 26 inches in diameter with a 5-inch face. The table is equipped with an adjustable back plate, a clamping screw and a reversing end-slot.

All three spindles are mounted on one saddle and therefore feed in unison. The base of the machine is surrounded by an oil pan. The lubrication tank is in the base of the machine, the lubricant being conveyed to the point of cutting by a pump provided with suitable pipe connections.

The American Society of Mechanical Engineers has issued its Year Book for 1918. The book contains the usual data and lists of officers and members. The growth of the society in the past year is evidenced by the additional thickness of the book, caused by 38 new pages in the section headed "List of Members."

More Women Needed For Works

Abolition of Military Exemption for Men Under 23 Intensifies Labor Problem for British Mills and Furnaces—More Steel Price Settlements Are Pending—Welcome Return by America of Borrowed Steel

Bureau of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., May 1.

KEENNESS to buy is concentrated chiefly on pig iron, especially forge and foundry material, the supply of which has been restricted by the transfer of certain Northamptonshire and Derbyshire blast furnaces to the production of basic. Production also is held back by the need of fuel and by a certain amount of congestion on the railways. Very few furnaces have much reserves of material, and the railways, like other organizations, are feeling the effect of the further demand for men. The midlands are getting a little relief, indirectly, from the improved production in the north of England, but all the Midland consumers want more supplies. It appears likely that, at the blast furnaces, the new military demand for men will have to be met by the introduction of more female labor. On the whole, women have done very well, but it is felt that blast furnace managers are approaching the limit in regard to the substitution of this kind of labor. The new order abolishing exemption from military service for young men under 23 can only have a limited effect at the blast furnaces, as special efforts have been made in the earlier recruiting movement to replace these young men. There are many complaints of coke scarcity.

Deliveries of Cleveland pig iron have been more satisfactory of late due to a steady increase in the production. This has enabled supplementary allotments to be issued. Consumers would be very glad to place heavy contracts. A different view of the matter is taken by makers, who are anxious with regard to future transport supplies, the maintenance of which is a very doubtful element. Exports to France show a tendency to increase. Italian exports make a less satisfactory showing. The warrant stock continues at 292 tons.

Steel Settlements Pending

The chief interest, for the moment, relates to finished and half-finished material. Several price settlements are known to be pending. The deputation of manufacturers appointed last week to confer on prices of gas strip with the ministry of munitions fully discussed the question in all its bearings, including the question of extras which is a matter of special concern. The manufacturers laid special emphasis on the necessity of imposing a proper limit upon the price of puddled bars. These bars have realized as much as £13 ($62.40), an impossible figure with unmarked bars being fixed at £13 17s 6d ($66.60). It is understood this material will be taken in hand and a suggested figure is £11 10s ($55.20). The makers of gas strip express their inability to accept the figure of £15 ($72.00) offered by the ministry as the new price, and it is believed that an agreement is likely to be arrived at on the basis of £15 5s ($73.20).

Another class of production in regard to which a price limit is expected, is small finished bars rolled from billets. These have shown extraordinary variations, quotations varying as much as £3 ($14.40) per ton. The selling rates of billets have still to be determined.

The forges and mills, especially the latter, are likely to be very materially affected by the new abolition of exemption from military service for young men under 23. This is rather a serious matter for mills, especially those dealing with small classes of iron, in which the operators are very largely young men coming within this age limit. This is not the kind of labor suitable for women, and older men with the requisite adaptability are not likely to be available. The present inclination is to make strong and united representations to the authorities as to the inevitable effect upon production, if this drastic order is indiscriminately applied to the staffs of the forges and mills.

America to Repay Steel

The announcement conveyed by THE IRON TRADE REVIEW cable, of the intention to repay 750,000 tons of steel borrowed from this country by General Pershing for the troops in France was very welcome. We have heard repeatedly of large orders for plain and corrugated sheets, wire, etc., needed for the American contingent, and if a good share of the repayment takes the form of half-finished steel of various descriptions it will be very welcome. Makers of sheets, tin plates and tinned sheets are all eagerly inquiring for the material needed.

The Staffordshire Tinned Sheet association recently advanced their prices by £3 ($14.40) per ton and lead-coated sheets were put up £1 ($4.80) per ton. This is a kind of material very largely called for for aircraft construction, and for certain kind of admiralty work. The enormous advance in the price of tin has directly affected this industry. It was impossible to get any large reserves of this metal, and tin actually has been bought at £350 ($1680) per ton.

Freight Rates Raised

New pig iron freight rates on the New York Central railroad from the Mahoning and Shenango valley furnaces to various points will go into effect May 9, the rate to Pittsburgh and Cleveland increasing from 95 cents a ton to $1.10; and to St. Louis from $3.18 to $3.70. New rates have gone into effect on the Detroit, Toledo & Ironton and Baltimore & Ohio railroads on pig iron from Ironton and Jackson, O., to these destinations: Chicago, being increased from $2.54 to $3 a ton; Cincinnati, from $1.20 to $1.40; to Cleveland, from $1.62 to $1.90; to Detroit, from $1.81 to $2.10; and to Indianapolis, from $1.58 to $1.80.

New rates on limestone from Marblehead, O., went into effect on April 25, these providing increases to the following destinations: Toledo, $0.37 to 0.40; Canton, $0.58 to 0.79; Erie, $0.74 to 0.90; Detroit, $0.63 to 0.70; Mahoning and Shenango valleys, $0.79 to 0.90; Buffalo, $1.36 to $1.50; Canal Dover, O., $0.58 to 0.70; Cleveland, $0.58 to 0.70; Wheeling, $0.63 to 0.70; Lorain, $0.32 to 0.40; Leetonia, 0.79 to 0.90; and Pittsburgh, $1.10 to $1.30.

Hartford Gets Meeting

The June meeting of the New England Foundrymen's association will be held in Hartford, but the program of the affair has not yet been made up. The July meeting, as has been the custom, will be omitted. An invitation has been extended by members in and about Providence, to have the August meeting held in that city.

War Work Forges Ahead in Far West

Pacific Coast Steel Co. Will Enlarge South San Francisco Plant—Coast Builders Get More Ship Contracts—Chrome Ore Output is to be Increased —Bethlehem Plants at San Francisco Enlarged

(Staff Correspondence.)

SAN FRANCISCO, May 18.—Work has been started by the Union Construction Co., San Francisco, on a new shipyard with four ways. It will employ about 3000 men and is located south of the Key Route mole in Oakland. A contract for ten 9400-ton steel vessels has been obtained from the Emergency Fleet corporation. The estimated cost of the new yard is $1,000,000 and the total contract price for the 10 vessels is more than $17,000,000. All of the work is to be completed within 22 months. Construction work on the first vessel is expected to start within five months. It will be completed within 11 or 12 months and after that the schedule calls for the completion of a vessel each month. The Union Construction Co. is a partnership formed by W. W. Johnson and H. G. Peake.

Work on another project involving an expenditure of $2,000,000 is to be begun at once at Hunters point, San Francisco, as a result of the government's acceptance of a proposal of the Bethlehem Shipbuilding Corp. to construct a large marine repair plant.

The Pacific Coast Steel Co., San Francisco, has recently authorized expenditures aggregating about $500,000 to increase the capacity of the company's South San Francisco plant. This works is now producing an average of 10,000 tons of open-hearth steel a month. A new 40-ton open-hearth furnace is being installed two of the 25-ton furnaces are to be enlarged to 40 tons capacity. A 28-inch mill has been authorized and a mill for rolling plates is under consideration.

In order to secure a steady supply of chrome ore, the Electro-Metallurgical Co., San Francisco, one of the largest producers of ferrochrome in America, has established the California Chrome Co., which is now in the field with an offer of $1.25 per unit for chrome ore containing 38 per cent of chromic oxide and upward.

Development of the properties operated by the Bethlehem Shipbuilding Corp. on San Francisco bay is not limited to any one plant. A new turbine shop has been added to the Alameda plant. It is 550 feet long and 160 feet wide and is served by one 60-ton and two 40-ton electric cranes in the main bay, with two 10-ton cranes in each side bay and two 5-ton cranes in each gallery. Another addition is soon to be made. The shops at the Risdon plant, which is now operated by the Bethlehem corporation, include a marine pipe and machine shop, 105 feet square; a blacksmith shop, 60 x 100 feet; a plate shop, 180 x 345 feet; a pattern shop 140 x 80 feet; a carpenter and boiler shop, 105 x 300 feet, a power house, 75 x 105 feet and a newly fitted galvanizing plant 75 x 77 feet. In the reconstruction of the plant a steel frame structure, 300 x 375 feet was raised 17 feet to permit of the building of ships on the five ways now constructed and the two soon to be laid down. This structure was raised by jack screws after the steel work had been cut loose from its foundations.

What Customs Compilations Show

Although there was a considerable decrease in the exportation of iron and steel from this port in the month of March, due to governmental embargoes, as compared with the immediately preceeding periods, some of the items, notably bar iron and steel, hoop iron and steel, steel rails, galvanized steel and iron sheets, steel sheets and structural steel, increased in volume and value over March, 1917, according to the compilations of the customs department here.

Steel plates show a heavy decrease in quantity when compared with March, 1917, and February, 1918. But the increased value of this product since a year ago is indicated by the customs figures which value 764 net tons at $151,264, during the current period and 6212 net tons and $580,781 in March, 1917. Tin plate amounted to 2418 net tons valued at $703,728. This is more than double in value and about one-third greater in quantity than the exportations during the same month a year ago.

Although there is a serious shortage of scrap iron here, some 199 tons, valued at $11,983, were shipped to China during the month. In March, 1917, 250 tons of iron were shipped to Japan, valued at only $5400.

Steel ingot shipments are conspicuous by their absence during March of this year. In the preceding month, 306 tons, valued at $23,040 left the port. Bar iron amounted to 338 net tons in March, 1917, were valued at $21,258. During March of this year 669 tons left the port valued $65,501. In February, 1918, 396 net tons, valued at $38,460, were exported.

The pig iron shipments during March, 1918, were negligible as compared with the preceding month of February and only about one-fourth as great as the exports of pig during March a year ago. The figures are: March, 1917, 84 tons, $3160; March, 1918, 20 tons, $1534; February, 1918, 465 tons, $41,760. Bar steel shipments were: March, 1917, 42 net tons; March, 1918, 6743 net tons, $686,628; February, 1918, 12,781 net tons, $1,387,117. Hoop steel and iron show a considerable gain over both March, 1917, and February, 1918. The figures are: March, 1917, 153 net tons, $13,879; March, 1918, 966 net tons, $172,385; February, 1918, 565 net tons, $90,206.

A comparison of other steel, iron and nonferrous products shows: Steel rails: March, 1917, 741 tons, $43,656; March, 1918, 1851 tons, $109,496; Febbruary, 1918, 3587 tons, $215,984.

Galvanized steel and iron sheets: March, 1917, 352 net tons, $46,702, March, 1918, 521 net tons, $98,320; February, 1918, 1296 net tons, $289,101.

Steel sheets: March, 1917, 650 net tons, $70,164; March, 1918, 2996 net tons, $389,546.

Structural steel: March 1917, 279 tons, $24,647; March, 1918, 1263 tons, $171,107; February, 1918, 4625 tons, $680,785.

A comparison by periods of the tin plate, lead pig and zinc sheet exportations gives the following:

Lead pig (from domestic ore): March, 1917, 90 net tons, $16,549; March, 1918, 65 net tons, $9068; February, 1918, 56 net tons, $789.

Lead pig (from foreign ore): March, 1917, 40 net tons, $7600; March, 1918, 280 net tons, $38,920; February, 1918, 784 net tons, $110,540.

Zinc sheets: March, 1917, 438 net tons, $18,677; March, 1918, 101 net tons, $44,319; February, 1918, 19 net tons, $9563.

Government to Take Iron

Canadian Munitions Board Agrees to Purchase Output of All New Furnaces—Consider Commandeering All Steel

TORONTO, May 20.—As a result of a recent conference between representatives of the steel companies, the Canadian government and the imperial munitions board, the government has agreed to purchase all pig iron produced in Canada by new blast furnaces erected during the next two years. Some of of the manufacturers strongly urged the granting of subsidies for the manufacture of pig iron, but after giving the matter thorough consideration, the government considered this inadvisable. The government will contract with any new producers to take all their output for a term of three years at a price to be regulated by the market conditions at the time.

Representatives of the larger steel companies were in conference with the Canadian government and the imperial munitions board at Ottawa recently regarding the maximum amount of steel which the companies can supply for war purposes. It is understood the question of commandeering the entire output of steel for war purposes was under consideration, but strong objections were raised on the ground that this would dislocate many departments of the plants and throw many men out of work. It was also urged that it would unsettle the trade of the companies and make it impossible to handle many lines of export trade. In view of this, it is hoped that some satisfactory solution of the problem may be found.

The Dominion Steel Corp. is making many extensions and improvements to its plant at Sydney, N. S., where much preparatory work is being undertaken for the construction of the ship plate mill of 100,000 tons per annum in accordance with its contract with the Canadian government. The ground is being cleared and the plans are in preparation. If sufficient labor is available it is expected the mill will be in operation before the time agreed upon. A new coke plant is being installed comprising two batteries of 60 by-product ovens each. They are of the Koppers type, 11.3 tons each, with a total guaranteed output of 1320 tons daily on 16-hour coking time. The first battery will be in operation in May and the second unit about a month later. The present coke oven plant comprises 620 Otto-Hoffman by-product 4 and 6¾-ton ovens, with a daily output of 1600 tons. This low production is due to the need of repairs which will be effected as soon as the new ovens are in operation. A Simon Carves coal washer is being erected to replace the present washer. The production of a better quality of washed coal is expected to improve the operation of the coke ovens.

A new bill to incorporate the Canadian Niagara Bridge Co. has been reported. The company, the list of whose directors is headed by Baron Shaughnessy, president of the Canadian Pacific railroad, and President Alfred H. Smith of the New York Central railroad proposes to construct a new international bridge across the Niagara river at some convenient point between Chippewa and Fort Erie on the Canadian side to the opposite side of the river in New York state. The approximate cost is estimated at $7,000,000. There was no objection to the plans of the company but there was some discussion as to details. The bill was amended to provide that the bridge should be 2 miles up the river from Chippawa creek so as not to interfere with the plans of the provincial hydroelectric commission and that a way for general traffic must be provided. The bridge is to be open to the use of all railways, the bill providing that the company may unite with any Canadian or American company or companies in building or maintaining the bridge. The work must be commenced within two years and finished within five years.

The steel and iron industries are but slightly affected by the war tax proposals of the Canadian government announced April 30. The business profits tax is continued and its scope extended so as to include all business employing a capital of $25,000, the rate of taxation on business using between $25,000 and $50,000 being fixed at 25 per cent of all profits exceeding 10 per cent. An excise tax of 10 per cent is placed on automobiles, gramophones, gramophone records and mechanical piano and organ players whether manufactured in Canada or imported. This tax will be computed in the case of imported articles on the valuation for custom entry, plus the duty, and in case of articles of domestic manufacture upon the manufacturers' selling price. Tractors and motors used for commercial purposes are not included. The Indian Peninsula Mining Co., a newly formed organization representing Cobalt and New York interests, has taken over a group of molybdenum claims situated on Indian Peninsula, on Lake Keewagama in the Hurricanaw river district, Quebec, some 20 miles south of Amos Station on the Transcontinental railway. A contract has been let for a 100-ton mill and three shafts will be sunk.

Fix Flange Steel Extras

On the recommendation of the subcommittee of sheet steel, the general committee of the American Iron and Steel institute has approved extras for flange steel, army specifications 434, under the sheet schedule. The extras over the base prices of No. 10 blue annealed sheets of $4.25, Pittsburgh, per 100 pounds are 50 cents per 100 pounds for flange steel and 25 cents per 100 pounds for flange steel commercial. These extras, which represent those quoted under normal market conditions by leading producers were adopted subsequent to the miscellaneous extras on sheets originally put out by the institute committee in connection with the base prices for the latter product. The government requirements for army flange steel have increased greatly since the general sheet extras were announced and this has been instrumental in bringing about the subsequent action of the institute committee.

Will Fly to Campus

Charles F. Kettering, president of the Dayton Engineering Laboratories Co., Dayton, will fly from the government Wright field from Dayton Columbus, May 25, to attend the annual alumni day festivities of Ohio State university. Mr. Kettering is an alumnus and trustee of the university. One of the features of the day's festivities will be the unfurling of a mammoth University service flag containing more than 3000 stars which represents the number of Ohio State men who are with the colors.

Leaders Will Dine

W. H. Donner, president of the Donner Steel Co., has invited a number of leading iron and steel men to a dinner the evening of May 29 at the Bellevue-Stratford, Philadelphia, to meet Charles M. Schwab, director general of the Emergency Fleet corporation. This promises to be a memorable gathering of the leaders of American industry.

Changes in War Industries Board

Steel Director Replogle and General Johnson Made New Members--Complete Line-Up of War Organization of Industries Showing Personnel of Various Divisions and Sections Announced by Chairman Baruch

WASHINGTON, May 21.—J. Leonard Replogle, director of steel supply for the government, and Brig. Gen. Hugh L. Johnson, the army officer who, as a colonel under Provost Marshal General Growder, is credited with the successful operation of the army draft law, have been made members of the war industries board, it became known definitely last week. They were appointed under the plan outlined by the President in his letter giving Bernard M. Baruch the chairmanship of the board, and which Mr. Baruch amplified later in a statement of what he expected to do in rebuilding the war machine.

While these men are to have definite places in the board, the entire organization is regarded as only tentative, likely to be changed materially by the operation of the new Overman bill which gives the President broad powers in reallocating the war authority of the various federal departments and bureaus. The board with its divisions as now functioning, is one of the most complex of the war bureaus. The general idea is that each division shall be made up of representatives of the more important war branches of the government.

The board and its subdivisions follow:

War Industries Board

Bernard M. Baruch, chairman; R. S. Brookings, Brigadier General Hugh L. Johnson, Rear Admiral F. F. Fletcher, Hugh Frayne, Judge Edwin B. Parker, George N. Peck, J. L. Replogle, L. L. Summers, Alexander Legge; H. P. Ingles, secretary; W. W. Phelps, assistant secretary.

Price Fixing Committee

Robert S. Brookings, chairman; B. M. Baruch, Hugh Frayne, H. A. Garfield, Brig. Gen. Hugh L. Johnson, Lieut. Col. F. S. Young, Commander John M. Hancock, W. B. Clover, Dr. T. W. Taussig; H. P. Ingels, acting secretary.

Labor Division

Hugh Frayne, chairman.

Allied Purchasing Commission

James A. Carr, business manager; James C. Leddy, F. E. Penick.

Requirements Division

Alexander Legge, chairman; B. M. Baruch, Judge Edwin B. Parker, priority; George N. Peek, finished products; J. Leonard Replogle, steel; L. L. Summers, Pope Yeatman, Col. George H. Estes, Capt. M. N. Taylor, Rear Admiral C. J. Peoples, J. L. Ackerson, Emergency Fleet corporation; T. F. Whitmarsh, food administration; M. B. Poole, Red Cross; T. C. Powell, railroad administration; Jas. A. Carr, allies; James Inglis, executive secretary.

Finished Products Division

George N. Peek, director; E. L. Crawford, assistant commissioner; Stanley Williamson, assistant.

Stored Materials Division

J. F. Wilkins, chief.

Statistical Division

Mills E. Case, acting drector.

Prortes Dvson

Judge E. B. Parker, prortes commssoner; Charles K. Foster, assstant to commssoner; Maj. Gen. J. B. Aleshire, any work othr than ordnance; George Armsby, agricultural implements, food, products and containers, mining equipment, pib tin, tin plate; H. H. Barbour, iron and steel products, sub committee on rating; Capt. F. E. Clark, navy; E. L. Crawford, finished products division; Col. W. W. Gibson, ordnance; C. P. Howland, Emergency Fleet corporation; Rear Admiral N. E. Mason, ordnance; Everett Morse, copper, wire, rope, woolen and cotton goods, tubing, etc.; Lucius P. Ordway, oil well and gas well machinery, lumber, etc.; T. C. Powell, railroad equipment and supplies; Lt. Col. F. S. Young, Rear Admiral A. V. Zane, F. H. Macpherson, chief of bureau of aplication and issue, Maurice Hirsch, secretary.

Priorities Board

Judge E. B. Parker, B. M. Barusch, Edward Chambers, director of traffic, railroad administration; Rear Admiral F. F. Fletcher, Alexander Legge, P. B. Noyes, director of conservation, fuel administration; Charles R. Piez, Emergency Fleet corporation; Clarence M. Wooley, war trade board; Brig. Gen. Hugh L. Johnson, H. G. Phillips, secretary.

Agricultural Implements, Animal and Hand-Drawn Vehicles and Wood Products

E. E. Parsonage, chief; P. B. Schravesande, assistant; Col. W. S. Wood, Major Seth Williams, marine corps.

Automobile Products

H. L. Horning, chief; H. J. Adams, master Howard S. Fisk, navy; Lt. Col. assistant; E. J. Hickey, Corker F. Clarkson, engineering matters; Pay-J. W. Furlow; Maj. Seth Williams.

Brass and Copper Tubing

Everett Morss, chief, J. W. Jasper, Emergency Fleet corporation; Seth Williams.

Building Materials

Richard L. Humphry, chief, S. I. Marks, navy, Capt. J. J. Mills, Major Seth Williams.

Chain

John C. Schmidt, chief Arthur E. Crockett, assistant, Lt. Commander S. R. Fuller, J. P. Bourke, Emergency Fleet corporation, Capt. Batcheller, Major Seth Williams.

Chemicals and Explosives

L. L. Summers, chief explosives; Chas. H. MacDowell, assistant, nitrates; J. H. Adams, mica; Albert Brunker, R. S. Hubbard and A. E. Wells, acids and heavy chemicals; C. H. Conner, wood distillation products, platinum commandeering and requisitioning; E. J. Haley, tanning materials, greases, tallows, vegitable oils and waxes;; J. M. Morehead, coal and gas products; Ira C. Darling, toluol distribution; A. G. Rosengarten, fine chemicals; H. W. Sanford, manganeses, chrome, etc.; Robert M. Torrence, glass-chemical carboys, chemical stoneware; William G. Woolfolk, brimstone, pyrites, etc.; Drs. H. R. Moody, Samuel Tucker and E. N. Weidlein, consulting staff inorganic chemicals, electrolysis, electrometallurgy, ceramics and refractories, organic compounds and die stuffs; Maj. Seth Williams; Donald Riley, S. R. Fuller, C. K. McDonald, S. I. Marks, C. M. Morford, navy representatives; Capt. Gelschen, Mr. Lockhart, Charles Rice, and Lt. Col. Spruance, army representatives.

Conversion of Industries

E. F. Bulmann, cranes; Alexander C. Brown, chief; L. P. Lipps, assistant; Capt. L. E. Stamp, assistant chief section, Capt. W. W. Houston, army; G. G. Green, navy; Major Seth Williams; H. L. Lewis, Emergency Fleet corporation.

Electric and Power Equipment

Walter Robbins, chief, L. W. Grothaus, assistant; M. M. Hughs, assistant; A. L. Bell, W. R. McCann, and Thos. B. Adams, Emergency Fleet corporation; Lt. Col. C. N. Black, ordnance department; Lt. Col. A. C. Christie, medical department; C. J. Katzenstein, bureau of supplies and accounts, navy deparment; H. R. Stuart, signal corps, Maj. Seth Williams.

Emergency Construction Committee

Col. W. A. Starrett, chairman, Capt. K. M. Murchison, Maj. C. Foster, Capt. A. H. Granger, Lieut. J. B. Talmage, W. F. Long, assistant section chief; F. L. Olmsted, John Donlin.

Fire Prevention

W. H. Merrill, chairman; Frank L. Pierce, W. E. Mallalieu, Geo. W. Booth

and Chas. H. Smith, secretaries and associate chiefs of section.

Hide, Leather and Tanning Material

C. F. C. Stout, chief; Maj. Jos. C. Byron, harness, bag, strap and belting leather; Henry W. Boyd, in charge of sole leather; Fred A. Vogel, in charge of upper leather; E. C. Shotwell, glove leather and sheepskins; E. J. Haley, tanning materials; Maj. Seth Williams.

Legal Section

R. J. Bulkley, chief; W. C. Saeger, H. M. Channing, C. W. McKelvey, H. A. Friedlich, Louis S. Weiss, F. T. Nelson, Adrian Ettinger, E. M. Dodd Jr., D. M. VanDoren.

Lumber

R. H. Dowman, chief; Chas. Edgar, Chas. H. Worcester, Walter E. Chamberlin, Frank H. Ransom, C. J. Winton, earl A. Smith, secretary; Maj. F. W. Leadbetter, C. M. Norford, F. K. Paxton, Emergency Fleet corporation; Maj. Seth Williams.

Machine Tools

G. E. Merryweather, chief; A. B. Einig, A. J. Baker, E. D. Crockett, Col. R. P. Lamont, Lieut. Com. S. R. Fuller, Maj. Seth Williams, Mr. Brill and H. L. Lewis, Emergency Fleet corporation.

Mica

H. J. Adams, chief; J. H. Magna, army representative.

Nonferrous Metals

Pope Yeatman, chief; E. C. Thurston, assistant; Capt. Corlies, Maj. Seth Williams.

Optical Glass and Instruments

Geo. E. Chatillon, chief; Capt. F. E. Wright, Com. W. R. Van Auken, Lieut. Pratt, supplies and accounts, navy; Maj. Seth Williams.

Power

Frederic Darlington, Maj. C. F. Lacombe, Maj. Geo. F. Sever, Capt. John C. Damon, Maj. Malcolm MacLaren, Capt. Carroll H. Shaw, Capt. A. M. Tinsley, Lieut. Chas. B. Lehmer, Lieut. Geo. K. Miltenberger, Lieut. W. W. Stanley.

Production Division

S. M. Vauclain, chairman; J. M. Hansen, car section; Henry R. Rea, locomotive section; E. F. Wood, Frank W. Morse and Admiral A. R. Couden, army and navy foreign section; G. M. Shaw, car section; Capt. H. W. Bells, Maj. Seth Williams.

Small Tools and Hardware

Murray Sargent, acting chiefs; Maj. Seth Williams.

Steel

J. Leonard Replogle, director; F. Purnell, J. C. McLauchlan, F. E. Thomson, Capt. W. L. McCleary, S. F. Fuller, J. W. Jasper, United States shipping board; Paul Mackell, Maj. Seth Williams.

Storage Committee

James Inglis, chairman; P. E. Forerder, vice chairman.

Supplies

Spencer Turner, chief; Grovenor Ely, H. L. Bailey, army representative; Paymaster Kane, Maj. Seth Williams, John P. Bourle, Walter C. Stitt, Lincoln Cromwell, cotton knitted goods; A. W. Lawrence, leather and rubber manufactured goods; Geo. F. Smith, cotton; linen thread and tapes; Sylvan Stroock, felts.

Tin

Geo. N. Armsby, chief; Lincoln Hutchinson, expert; C. R. Jasper, Capt. Corlies, S. I. Marks, Maj. Seth Williams.

Wire and Cable

Leroy Clark, chief; S. I. Marks, S. R. McCann, Emergency Fleet corporation; Maj. I. D. Hough, Maj. Seth Williams.

Wood Chemicals Section

C. H. Conner, chief; A. H. Smith, R. D. Walker, G. E. DeNike, Dr. W. Bean, signal corps; Maj. Seth Williams.

Prepare to Cut Down List of Farm Implements

Washington, May 21.—Efforts of the conservation division of the war industries board toward the elimination of the manufacture of unnecessary varieties and styles in farm implements has been making considerable progress. A call has been issued for one or more meetings at Washington, May 23, of representatives of various implement and dealers' associations, which will put the division in possession of data bearing upon the subject from all branches, both manufacturing and distribution. Questionnaires now are being circulated among the manufacturers to elicit information upon which the elimination of certain sizes and types of implements will be sought dating from Nov. 1, 1918. It is stated by the conservation division that it is its desire to eliminate as far as possible all nonessentials in farming implement production. In order that this matter may be handled prudently and fairly, the division will work in cooperation with the department of agriculture. Before any eliminations are determined upon, the department of agriculture will be consulted, as will also the farmers' advisory committee, which has been created to advise the department of agriculture and the food administration.

Capital Odds and Ends

WASHINGTON, May 21.—The automatic and other modern machinery used in making corks, crowns, discs and stoppers in this country is the most efficient machinery for the purpose in the world, according to the tariff commission in its report of the preliminary investigation of the cork industry. So efficient is some of the machinery now on the market that the element of labor plays a smaller and smaller role in cork manufacture and there is a tendency to employ female labor instead of male, as one girl can do the work that formerly required three men, the report says.

* * *

Increase in the rates on iron and steel, special iron, agricultural implements, fencing, grates, radiators, stoves and ranges and brick and fire clay, from St. Louis and points taking the same rates are sought by carriers.

* * *

Cancellation of the carload commodity rate of 5 cents per 100 pounds on mangesite is sought by the Pacific freight tariff bureau from Nadeau Park, Cal., to San Pedro, Cal., by way of the Atchison, Topeka & Santa Fe and the Los Angeles & Salt Lake railroads.

* * *

Railroads seek increases of from 1 to 42 cents per ton in the rates on scrap iron, billets, cast iron pipe and articles taking the same rates from Cincinnati, Evansville and Jeffersonville, Ind., Louisville, Ky., Cairo and Thebes, Ill., to Colona, Carbon Cliff and Silvis, Ill.

* * *

Increases of 1 cent and 3 cents per 100 pounds in carload and 1 cent per 100 pounds in less than carload rates on manufactured iron and steel articles are sought by the Buffalo, Rochester & Pittsburgh railroad from Pittsburgh and New Castle points to points on the Long Island railroad.

* * *

Additional regulations governing the prices of coke have been issued by the fuel administration for Colorado. The maximum price per ton of 2000 pounds, f.o.b. cars at ovens anywhere in the state for screened and sized crushed beehive coke is fixed at $9.80. The order was effective May 7.

* * *

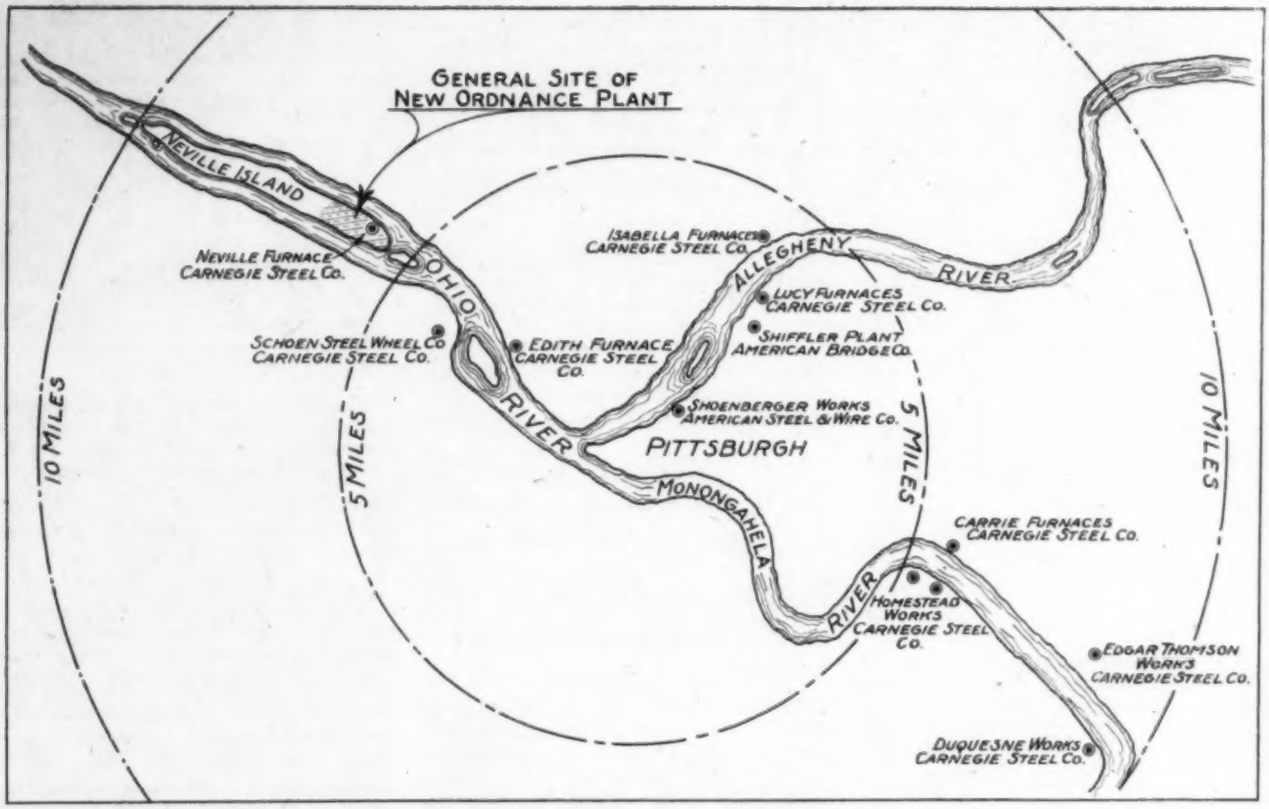
Establishment of a uniform scale of charges in the wharfage, storage and handling of iron and steel articles is sought by the Atlantic Coast Line railroad at Norfolk, Pinners Point, Va.; Wilmington, Newbern, Washington, N. C.; Charleston, S. C.; Savannah and Brunswich, Ga.; and Jacksonville and Port Tampa, Fla.

* * *

The fuel administration's coal price adjustments include $2.65 for run of mine, $2.90 for prepared sizes and $2.40 for slack, all on coal from mines operated near St. Charles, Va., by the Virginia Iron, Coal & Coke Co., the Virginia Lee Co., the Darby Coal Mining Co. and the Black Mountain Mining Co.

* * *

Increases ranging from 15 to 22 cents per ton in the rates on pig iron, billets and bloom, cast iron pipe and iron and steel rails are asked by the Southeastern Mississippi Valley association from southern producing points to Ohio and Missisippi river crosings, Gulf and Virginia cities, and establishment of through rates to points beyond these gateways to reflect the increases proposed.



Site of Neville Island Ordnance Plant and Its Relation to Steel Corporation Furnaces and Steel Works

Drive Ahead On Great Ordnance Works

PITTSBURGH, May 21.—Excavation work preliminary to the erection of the big ordnance plant on Neville island will begin as soon as rapidly developing plans are worked out. Because of its great size and the immense machinery and machine tool equipment that will be required it probably will be more than two years before the plant will be producing guns and projectiles. Essentially it will first of all be a machine shop with foundries, and open-hearth furnaces, which together with the Neville island blast furnace of the American Steel & Wire Co., operated by the Carnegie Steel Co., will constitute a complete unit from pig iron to the finished product.

The site probably will occupy the entire available space on the island, according to an official statement issued by Lieut. Col. C. W. Watson, of the staff of Col. Samuel McRoberts, who has been sent to Pittsburgh to act for the war department with the representatives of the United States Steel Corp. The island is about five miles long, and three-fourths of a mile wide. Besides the blast furnace of the American Steel & Wire Co., the island has on it several other industries, including the Witherow Steel Co., Pittsburgh-Des Moines Steel Co., Dravo Contracting Co., Republic Chemical Co., Graham Nut Co., Oil Petroleum Co., Concrete Products Co., and the Independent Bridge Co. The Jones & Laughlin Steel Co., also has a site on the island and has planned to erect a storage house for coal and ore there.

It is assumed that the plants of these companies will not be disturbed. In his statement Lieutenant Colonel Watson said the United States government proposes to purchase or condemn sufficient real estate to construct a munitions plant for the manufacturing of cannon and projectiles. The real estate value, he said, will be determined by a board selected by the representatives of the ordnance department and deeds will be taken directly in the name of the United States from those owners who will sell to the United States upon the basis of normal times and upon sales made prior to the approximate date of the public announcement of the proposed plant construction. Proper allowance, the statement pointed out, will be made for growing crops, farm implements and movable property, and the compensation of value will be fair and adequate. Commissions will not be paid and negotiations will be conducted directly with the respective owners of properties desired. If exorbitant prices are demanded, the army officers said, the lands will be acquired by condemnation. The statement added that the Steel corporation and its subsidiaries have no interest in the purchases and that the corporation's total compensation for constructing and operating the plant is $1.

The statement was issued following a conference with a committee of 10 Steel corporation officials who were selected to draft plans for the proposed plant and they are co-operating with John S. Oursler, who was general superintendent of the Farrell Works of the Carnegie Steel Co. Mr. Oursler has been selected as manager of construction of the plant and has opened offices in the Union Arcade building, Pittsburgh.

The committee of 10 consists of the following: John Reis, vice president, and William J. Filbert, comptroller of the United States Steel Corp.; Homer Williams, president of the Carnegie Steel Co.; Taylor Allderdice, vice president of the National Tube Co.; August Ziesing, president of the American Bridge Co.; C. C. Thorp, vice president of the Indiana Steel Co.; George G. Crawford, president of the Tennessee Coal, Iron & Railroad Co.; William Whigham, vice president of the Carnegie Steel Co.; C. L. Miller, vice president and general manager of the American Steel & Wire Co., and W. B. Schiller, president of the National Tube Co. Mr. Reis is chairman of the committee.

Following the selection of the committee, the United States Steel Corp. ordnance department was organized with Mr. Oursler as general manager; L. E. Thomas, chief engineer at the Gary works, chief engineer; F. W. Waterman, manager of the Gary works of the National Tube Co., assistant manager; George Brown, purchasing agent of the National Tube Co., purchasing agent; R. C. Cochran, traveling auditor of the American Sheet & Tin Plate Co., auditor. John Hulst, chief engineer of the Steel corporation; P. C. Patterson, chief engineer of the National Tube Co., and J. L. Bernard, chief mechanical engineer of the American Bridge Co., have been appointed to act with the general committee.

The men composing the United Steel Corp. ordnance department, including the general committee and engineers appointed, will devote their time to the work of building the ordnance plant and until this has been accomplished the Steel corporation will be deprived of their services to a great extent, which means a sacrifice both on the part of the men and the corporation.

Carnegie to Operate Plant

The plant, it is believed, will be built by the American Bridge Co., and will be operated by the Carnegie Steel Co. The corporation will supply its best engineering and steelmaking ability from its various subsidiaries and will so select them that the least disturbance possible in its regular organization will occur. The securing of some of the machinery and machine tool equipment may offer a serious problem. Some of the larger units include 18,000-ton hydraulic forging presses. Boring mills, larged sized lathes, drills, etc., also may be difficult to get. Foundry equipment, it is thought, can be secured in sufficient time. Nothing official has been given out as to whether the one blast furnace will be sufficient to meet requirements. Its daily capacity is approximately 400 tons. It is said unofficially that probably ten 60-ton furnaces will be built. Coke for the blast furnaces and cupolas will be brought up the Monongahela and Ohio rivers from the Clairton by-product plant of the Carnegie Steel Co., coal will come from nearby mines by river and ore at first will come by way of Lorain, O.

The finished product, according to reports, consisting of heavy guns and projectiles from 8-inch to 16-inch, will be loaded on barges, and sent down the Ohio and Mississippi rivers to New Orleans for distribution by ocean to their destinations. It evidently is intended to manufacture heavy seacoast guns for defenses on both the Atlantic and Pacific coasts and mobile guns for mounting on specially built rail lines. It also is assumed ordnance for use abroad will be made if the European war is not over when the plant is completed.

It is understood also that a town for laborers at the plant will be built on the island. Reports have it that at least 2500 experienced gun and projectile makers will be employed immediately after the plant is completed and this will be greatly augmented later. Employment bureaus will be opened by the government to secure labor, a question which is a serious one.

The plant will occupy the upper head of the island and will be built directly adjoining the blast furnace. The island itself has street car, train and river approaches and is above the flood lines. There are double tracks of the Pittsburgh Railways Co., extending the full length of the island, the cars entering by way of a bridge near McKees Rocks and leaving the island at Coraopolis. Traffic service may be changed considerably to better suit demands.

The present dam system insures for the plant a requisite slackwater and the erection of the new stationary dam at Elmsworth, which is to be the first step in supplanting of the movable dams on the Ohio, will give an even more advantageous water position to Neville island and particularly to that end of the island upon which the plant is to be erected.

To get river coal will be simple as position of the plant requires a short run down the Ohio river from both the Monongahela and the Allegheny rivers. From the Monongahela river will come its most immediate supply of river coal, because it is developed as the Allegheny is not and is better slackwatered. Monongahela mines could easily increase their supply to care for this plant. Lock No. 3 on that river passed through 16,000,000 tons of coal last year, and government engineer officers in charge of the rivers here said that this could be doubled without difficulty. In some sources the selection of Neville island was regarded as indicative of a conviction on the part of the government that the Ohio ship canal will be built. Otherwise, it is argued the plant probably would never have been located on a spot which will be on the direct ore water route if that project ever comes to an actuality. One of the principal arguments advanced in Pittsburgh in favor of the canal is that it would make a direct all-water ore route from Lake Superior mines and other upper lake shipping points to the mills in this section. That canal would strike the Ohio river near Beaver. In the light of that fact it is considered significant that the government has committed itself to a policy of dam replacements that will eventually put permanent dams all the way from Pittsburgh to Beaver, in place of the present movable structures.

Detroit's Steel Needs Rise

DETROIT, May 21.—Recent statistics show that in the Detroit industrial area are 220 plants, manufacturing, consuming and fabricating iron, steel and other metals. These plants have a capitalization of $85,000,000. Since Jan. 1 these figures have been greatly increased. Since the production of the first bessemer steel billets in the country, at the Wyandotte Rolling Mills, in 1853, Detroit has been among the biggest users of steel and iron. The first iron furnace west of Pittsburgh was established in the late forties on the Detroit river front. The first boiler shop was the pioneer of all, having been established in 1847. Copper smelting began in 1850, the first car works was built in 1853, and stove manufacture began in 1860. Three years later a bridge and iron works commenced operations and what now is the Great Lakes Engineering Co. started in 1863.

The first iron vessel for the Great Lakes was built at Detroit in 1872. Rolling of brass and copper sheets and the beginning of the manufacture of malleable iron featured the year of 1881. The first automobile company was established in 1891 and the Packard, Cadillac and Ford companies were incorporated in 1903.

Metal working lines, which have felt the shortage of labor more acutely than any other industry in the city, have been experimenting extensively with the dilution of man power by the introduction of female labor. Out of 260,000 industrial employes in Detroit, 176,000 or 68 per cent are engaged in the metal trades. One hundred and three thousand of this number are in the motor car and accessory division alone. In a recent survey to determine to what extent female labor now is being employed and the extent to which it could be employed, if necessary, companies employing 103,799 men reported that they could use female labor. The census was taken in plants employing a total of 113,699 persons, the largest of them engaging 37,000 and the smallest 150. Plants employing 9900 reported they could not use female labor. The extent to which women can be introduced into industries here varies from 3 to 33 per cent or an average of 19 per cent.

Nonessentials Must Be Set Aside

Machinery and Supply Manufacturers and Dealers in Concurrent Sessions of Four National Associations Deliberate War Problems and Emphasize Necessity for Subordinating Self-Interest in the Present Struggle

COMPLETE subservience of personal interest as the groundwork upon which to build victory was the theme of the convention of machinery and supply men, held in Cleveland during the week of May 13. The present uncertainty soon to take the form of a definite line between essential and nonessential was dwelt upon at length in the addresses at the sessions throughout the week. The National Pipe and Supplies association met on May 13 and 14 and during the following three days the Southern Supply and Machinery Dealers' association, the American Supply and Machinery Manufacturers' association and the National Supply and Machinery Dealers' association were in convention. At the various joint sessions which were held men of national prominence presented their judgment as to the war duties and responsibilities of the industries and organizations represented. Steel and iron, which together are so essential, and which have taken the lead in pledging 100 per cent war service, formed the background about which the whole question of the responsibility of machinery and supply men was developed. The conservation, perhaps better the consecration of iron and steel to war service was driven home by practically every speaker.

A year ago we had no conception of the demand the war would make on our industries, said John J. Kennedy, general sales manager of the National Tube Co., in speaking to the National Pipe and Supplies association. At a meeting in Philadelphia one month after the commencement of the war it was estimated the war needs would amount to from 4,000,000 to 6,000,000 tons of iron per year. Today the war is taking all the country can possibly produce. On April 26, just past, the principal steel manufacturers of the country met in New York and signed a pledge to subordinate all other lines to the business of war. At the same meeting J. Leonard Replogle stated that government orders then represented eight months output for the steel mills of the country at the rate they had been going during the three preceding months. These requirements will be met at the expense of any other consideration. Manufacturers of nonessentials must go. No one will be permitted to manufacture articles in greater amounts than the actual needs of the country require. The government will take care that materials do not go into nonessential uses. Keep that pledge in mind. It behooves us all to forget our own personal interests and do everything to aid in winning the war as soon as possible.

"Month by month more and more steel will go to the government," said W. E. Manning, vice president of the Youngstown Sheet & Tube Co. "The pledge of 100 per cent to the govern- was not taken on the spur of the moment, but after a full realization

L. C. HUESMAN,
Re-elected President of the National Pipe and Supplies association

of the situation. Dealers who are inclined to complain about deliveries must remember that the manufacturers are doing war work, and cannot deliver as well as they would like.

That the mill supply houses of the country should reduce their stocks of nonessential articles and concentrate their efforts on giving the war industries, railroads, and shipyards the supplies and machinery directly needed to win the war, was the advice of H. W. Strong, of Cleveland, in his annual address as president of the National Supply and Machinery Dealers' association. He stated:

It is probable that in the stocks of goods carried by all the members of this association there are some lines which, at the present time are far less likely to be active than in times of peace. With the rapidly changing character of the business of the country, and with the tendency so directly towards the business of the country all being put on a war footing, it is likely that we all have some lines of goods which minister to the strictly nonessential industries. There are some of our lines which possibly are carried by three or four or a half dozen other branches of the supply trade, and these, as well as the ones which are not strictly confined to the essential industries, it is my belief, should be either abandoned or materially reduced until after the war. I apprehend that in the city of Cleveland alone there are several hundred thousand dollars tied up in stocks in the various supply houses for which the demand is not great enough to warrant such an investment. If these stocks are sold out and the inventory allowed to run down, so as to be used in other lines which are directly contributing to the war needs of the country, it is of direct assistance to the government and it may be of direct assistance to ourselves as well. In this connection it is necessary to remember that it is only the increase in the amount of goods that we are obliged to carry as against the quantities that would suffice three years ago. It is also the advance in the cost of practically all of our lines which helps swell our inventory to such unwarranted proportions.

In 50 standard lines that we carry in stock the average advance in our cost during the past four years has been 135 per cent, and this enormous increase in cost per unit taken in addition to the necessary increase in quantities causes us to realize at once, why, in spite of excellent business, and the increased profits which are bound to show on the books as the result of a continuous rising market, there is an equally continuous shortage of funds. A rigid paring down of stocks which are in the nonessential class may be a distinct alleviation along this line, and we began to work this out some months ago, feeling that it was a necessity of the times.

H. W. Strong, the Strong, Carlyle & Hammond Co., Cleveland, president of the National Supply and Machinery Dealers' association, presided at a joint session of this body with the Southern Supply and Machinery Dealers' association. The opportunity for service on the part of the dealer was pointed out by a number of executives from manufacturing and sales organizations.

Melville W. Mix, president, Dodge Mfg. Co., Mishawaka, Ind., spoke on the problems of the manufacturers of transmission equipment in the light of the war. He recommended the substitution of stock sizes, especially in shafting, for those which by the

nature of the design were special. To attain this end, he suggested the speeding up and consequent reduction of area of section, the use of split wood pulleys where possible, and the substitution of list of ranges in size for a specific size in ordering from the manufacturer. He deprecated any speculation in stocks of shafting and similar material at this time, but recommended a stock list to be kept accurately and up to date. He stated that every effort by the individual would remove a part of the load from the steel camel's back.

Richard T. Lane, sales manager, the Standard Tool Co., Cleveland, summarized the shipbuilding, artillery, truck, and airplane requirements to show a few of the reasons why dealers could not receive under a 14-month delivery date on some lines of small tools. He stated that where his company formerly carried over 13,000 sizes of a particular line in stock, they are now reduced to a mere skeleton of that line. He, too, stated that speculation in stock should be avoided. He said:

"If the increased demand for small tools had been uniform, it would have been a comparatively simple problem, but it wasn't. On some sizes the demand has remained about the same, on others the demand has increased 400 to 500 times. When you stop to consider that the machinery we use is not to be found in the open market, but must be made in our own shop, you have some idea of the magnitude of the work.

Essentials Paramount

Farnham Yardley, president, Jenkins Bros., New York, called time on the nonessential, and put the question of a choice squarely before the dealers. He said:

There are not men and there are not materials enough in this country to supply the war needs and our normal needs, and as the business of the day is the winning of the war, the normal needs must be subordinated and priority must be given to the war needs.

For my part, I believe that as the war goes on we will of necessity differentiate, more than we have in the past, between the essentials and the nonessentials. The essentials, of course, are those things that are necessary for our health, for our efficiency, and for winning the war; the nonessentials are those things that can wait until after the war is over.

A nation at war is an insistent buyer of commodities. At the outbreak of the European war several such buyers entered our market. Their insistent buying power led to an intensification of the market demands. Industrial plants, in laying plans for expansion to care for war contracts went into the market bidding for capital in the form of buildings, new machinery, raw materials and labor.

It must be self-evident to all that there will be a shifting in the labor situation; that those who are now employed on the so-called luxuries will find employment in the making of essentials. The government will properly more carefully scrutinize the consumption of raw material, in order that there will be no waste of manpower in the making of things that are not required for the business in which this country is now engaged.

William E. Manning, vice president, the Youngstown Sheet & Tube Co., Youngstown, O., emphasized the 100 per cent pledge of the steel manufacturers, and called attention to the immense quantity of steel which is not available for machine and tool manufacture. Shells were classed as nonproductive in this sense, and it

MELVILLE W. MIX,
Elected President of the American Supply and Machinery Manufacturers association

is commonly stated that 35 per cent of many steel manufacturers is going into shell steel. He asked the cooperation of dealers to see that the steel products they sold were for government purposes solely, and stated that this was vitally necessary to secure what was essential for war production.

N. J. Clarke, secretary, Upson Nut Co., Cleveland, told of the vast quantity of nuts and bolts required in vital war work. He dwelt on the point that any dealer selling from stock to government purchasers, or to sources having priority, should at once avail themselves of the priority privilege of replenishing this stock against future requirements. He spoke of the enormous demands being made upon the nut and bolt manufacturers by the government and others he said: "One instance is that of an order for 2000 hangars for housing airplanes, each with a capacity of four airplanes. This order required 6,000,000 bolts of one size, ¾-inch machine bolts.

"On an order for artillery wheels, 16,000,000 wheel bolts, all of one size, were ordered at one time.

"The freight car order just placed requires 15,000 tons of rivets.

"On one order for 129,000,000 bolts the industry was able to furnish 25 per cent of the order from stock, by calling on all manufacturers. Another order is for 51,000,000, all large machine bolts.

"As for the government demands I will say that the steel trade is on probation. It is being given a chance to give the government needs 100 per cent service on its own initiative. If the government does not get its 100 per cent it will begin to take steps to see that the raw material is properly distributed according to war needs."

Predictions of higher freight rates, increased wages to employes and the ultimate return of the railroads to private ownership after the war, were some of the high spots in an address given by Samuel O. Dunn, editor of *The Railway Age*, before a joint session of the National, Southern, and the American Supply associations.

Elect New Officers

L. C. Huesmann, of Indianapolis, was re-elected as president of the National Pipe & Supplies association. Vice presidents elected were: George V. Denny, Savannah, Ga., and Rolin F. Woodruff, Pittsburgh. George D. McIlvane, Pittsburgh, was continued as secretary-treasurer. W. M. Pattison, Cleveland, was chosen to head a committee to push the fight on unfair price-cutting.

J. D. Nicklis, of the Manning, Maxwell & Moore Co., New York, was elected president of the National Supply and Machinery Dealers' association; Anton Vonnegut, of the Vonnegut Machinery Co., Indianapolis, Ind., vice president, and Thomas Fernley, Philadelphia, secretary.

M. W. Mix, Dodge Sales & Engineering Co., Mishawaka, Ind., was elected president of the American Supply and Machinery Manufacturers' association; George T. Bailey, Oliver Iron & Steel Co., Pittsburgh, first vice president, and F. D. Mitchell, New York, secretary-treasurer.

W. B. Simpson, C. T. Patterson Co., Ltd., New Orleans, was chosen president of the Southern Supply and Machinery Dealers' association; W. J. Shaefer, Russell Hardware Co., McAllister, Okla., and J. H. Haslan, Georgia Supply Co., Savannah, Ga., vice president; and Alvin M. Smith, Smith-Courtney Co., Richmond, Va., secretary-treasurer.

Outline War Labor Board's Methods

National Body Arbitrates When Its Sections or Subcommittees Fail to Effect Settlements of Labor Controversies—Many Strikers Return to Work When Informed That It is Handling Their Cases

RECENT sessions of the National War Labor Board, on which ex-President William H. Taft and Frank P. Walsh serve as joint chairmen, have resulted in the announcement of its rules for taking up industrial disputes and the methods to be followed in the adjudication of controversies. This announcement provides for the appointment of subcommittees composed of two members to act for the board in every local controversy; the appointment of permanent local committees in cities and districts to act in difficulties arising therein and the sending of trained field agents by the board from Washington into territories for the purpose of making investigations, etc.

The board itself will sit in hearing upon cases only when its sections or subcommittees or local committees are unable to settle a controversy. In that event, it will sit as a board of arbitration, decide the controversy and make an award. It will hear appeals where the principles established by the President in his proclamation of April 8, have been violated; where an award made by a board has not been put into effect or where employes have refused to accept or abide by such an award. It too will determine questions of jurisdiction as between government boards.

Rule for Filing Applications

Individuals who desire to bring to the attention of the board, any issue between employer and employes, will deliver to its secretary a signed statement, giving a brief description of the grievance and the names of the persons or corporations against whom he complains with their postoffice address. When both employer and employes desire to submit a controversy, they are to sign and submit to the board's secretary, a joint statement, giving a description and requesting action by the board. When Secretary of Labor Wilson invokes action by the board, all documents are to be delivered by him to the secretary of the board who will file them in his office, indorsed with the date of filing. The secretary will keep one docket for the filing of all complaints, submissions and references, each case receiving a number. He will digest all cases presented and bring them to the prompt attention of the board for its action.

Three board members, two representing employers and one representing employes shall act for the board by appointment of the joint chairman, in every local controversy. This "section" of the board will hear and adjust cases assigned to it and failing in adjustment, will summarize and analyze the facts, presenting them to the board with its recommendations. To accompany such sections for the purpose of assisting in investigation, analyzing the evidence, etc., trained and experienced men of neutral attitude are to be selected by the secretary as examiners. Permanent local committees in any city or district may be appointed by the board to act in cases arising in these territories. Recommendations as to candidates for such service will be received by the board from employers' associations, etc. Board sections have the power to appoint temporary local committees where permanent ones have not been named by the board. Two special field representatives may be selected by the secretary from names submitted by the joint chairmen. These are to make an investigation of any complaint to ascertain facts before the intervention of the board section. When efforts of sections, local committees, etc., fail to settle a controversy, the board will sit as a board of arbitration, render a decision and make an award. If it cannot reach a unanimous conclusion, it will select an umpire to review the issues and render his award.

Since efforts of J. L. Spangler and E. P. Marsh, commissioners of conciliation of the department of labor to settle the controversy at the Bethlehem Steel Co., Secretary of Labor Wilson turned over all the data to the board with the request that it assume jurisdiction. Workers claim violation by the employer of certain principles governing industrial relations. A section of the board, composed of Thomas Savage, representing labor and Herbert H. Rice, representing employers was accordingly appointed to arrive at a settlement. When the 6000 striking machinists and electrical workers at Bethlehem were notified that this section had been appointed, they returned to work under existing conditions.

At Schenectady, N. Y., where 22,000 metalworkers employed by the General Electric Co., and other plants, are involved in a controversy, an agreement has been reached whereby the men return to work, pending a decision of a section of the board, composed of Fred. C. Hood, representing employers and Adam Wilkinson, representing labor. This section will also endeavor to settle a controversy at Pittsfield, Mass., where 6000 metalworkers went out on a strike recently, but who have returned to work, pending a settlement.

Chairmen Travel West

In harmony with its program the joint chairmen of the National War Labor Board will visit Kansas City May 24, to conduct an inquiry into a controversy between the Pittsburgh & Joplin railway and its employes and the day following will go to St. Louis to adjust the differences of the St. Joseph Lead Co., and its employes at the smelter at Herculaneum, Mo. On May 27, this section of the board will endeavor to adjust the dispute between the Detroit United railway and its employes at Detroit and on May 28, it will visit Cleveland and seek to conclude the controversy between the Cleveland Railway Co., and its employes.

Sale Price of Sheets and Tin Plate Recedes

The bimonthly sheet and tin plate wage settlement at Joliet, Ill., held in Joliet, Ill., showed a further recession in the average sales price of shipped products for the March-April period. Sales sheets when examined showed that during that period 26, 27 and 28-gage black sheets sold at an average of $5.10 per 100 pounds as against $5.35 in January and February, compared with $5.50 the last two months of 1917. Tin plate's average sale's price per base box was $8 against $8.40 the previous two months and $8.60 in November and December of last year. These receding sales prices carry a wage reduction for May and June of 7½ per cent for sheet workers and 8 per cent for tin plate operatives based on the base rate, which means an actual wage cut of about 3 and 4 per cent respectively from what sheet workers and tin plate men had been receiving.

The members voted down a move to ask for a base rate advance for tin workers. It was the sense of the convention that for the time being action along this line be confined to a move to improve working conditions.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

THOMAS K. GLENN, recently elected a director of the American Iron and Steel institute for the term ending in 1921, to succeed Col. J. C. Maben, retired because of ill health, has been president of the Atlantic Steel Co., Atlanta, Ga., since early in 1908. He then came to the company with a well-rounded business knowledge and executive experience. He began his business career in the office of Joel Hurt, president of the Atlanta Home Insurance Co., and later became connected with the street railway system as claim agent. He advanced steadily until he became vice president of the Georgia Railway & Electric Co., general manager of the street railway department of that organization and vice president of the Atlanta Northern railway. When David Woodward resigned as president of the Atlanta Steel Co. early in 1908, the duties of the office fell temporarily upon Charles E. Currier, vice president, until Mr. Glenn's services were secured. When in December, 1915, the Atlanta Steel Co., was sold to a company headed by the New York banking house of William Morris Imbrie & Co., the name was changed to the Atlantic Steel Co. The officers of the old organization were retained and Mr. Glenn has been serving as president ever since.

Clarence F. Bennett, vice president of the Stanley Works, New Britain, Conn., is chairman of the Red Cross drive in that city, this week.

Fred C. Deming, sales manager for the Carnegie Steel Co., in the Buffalo district has been made a director of that city's chamber of commerce.

J. O. Eaton, treasurer of the Torbenson Axle Co., Cleveland, has been elected to executive office in the newly organized Tractor Parts Co., that city.

C. M. Stowe, salesman in the Chicago office of Hickman, Williams & Co., pig iron dealers, recently entered the national army. He has reported at Camp Grant, Rockford, Ill., for training.

E. S. Edwards formerly of Detroit, will have charge of the New York office in the Singer building, to be opened by the Stalnaker Steel Co., Pittsburgh.

John T. Faig, a professor in the engineering department of the University of Cincinnati, has been appointed president of the Ohio Mechanics Institute to succeed Prof. John L. Shearer, who recently resigned.

F. E. Hurst has been made assistant to H. L. Innes, vice president and general manager of the Doble-Detroit Steam Motors Co., Detroit. Mr. Hurst was formerly assistant factory manager of the Chevrolet Motor Co., that city.

THOMAS K. GLENN

W. H. Peterson became affiliated with Charles Hubbard & Co., 81 Fulton street, New York, dealers in coke and metal products, upon his recent resignation as New York sales manager of the Penn Seaboard Steel Corp.

C. Oberstadt, resigned recently as superintendent of the Cleveland plant of the Elyria Iron & Steel Co., Elyria, O. After a vacation, he will assume new work concerning which no announcement has been made.

Evan F. Jones, treasurer and general manager of the Morgan Spring Co., Worcester, Mass., recently resigned as president of the Norcross Bros. Co., general contractor, that city. He remains as director and stockholder.

H. W. Coffin, vice president and general manager of the Alabama Co., Birmingham, was chairman of the third Liberty loan committee which made a highly successful campaign in the Birmingham district.

Leonard W. Williams, Park & Williams, Philadelphia, is now located in Washington where he will serve in the pig iron division of the war industries board as assistant to Jay C. McLauchlan, formerly of Cleveland.

Wilbur B. Driver, former vice president of the Driver-Harris Co., Harrison, N. J., recently retired from active participation in the business. First, second and third vice presidents are now Arlington Bensen, Leon O. Hart and Frank L. Driver Jr., respectively.

Frank B. Lounsberry, chief metallurgist of the Atlas Crucible Steel Co., Dunkirk, N. Y., addressed the regular monthly meeting of the Pittsburgh Foundrymen's association, Pittsburgh, May 20, on "The Manufacture and Development of High Speed Steel."

V. P. Signorelli recently resigned as secretary and assistant treasurer of the Southwark Foundry & Machine Co., Philadelphia, to become office manager and auditor of the foundation company —Carpenter-Watkins, Inc., Brunswick, Ga.

Henry D. Miles, president of the Buffalo Foundry & Machine Co., Buffalo, N. Y., has been made president of the chamber of commerce in that city, to succeed Archer A. Landon, who now is assisting John D. Ryan in charge of aircraft production.

G. Marshall Everson, 313 Sixth avenue, Pittsburgh, who until recently as assistant manager of the steel works of Henry Disston, Inc., Philadelphia, has taken over the business of his father, the late T. Bissell Everson. He will engage in the buying and selling of rolling mill equipment.

W. S. Murrian became president of the Southern Locomotive Valve Gear Co., Knoxville, Tenn., upon his resignation as superintendent of motive power and equipment on the lines east and west of the Southern Railway, with headquarters in that city. He succeeds General L. D. Tyson, now in active service of the United States army, who has been president since the company was organized. Mr. Murrian learned the machinist's trade and by hard work has won this latest honor, preceded by many promotions.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

R. W. H. ATCHERSON has been appointed superintendent of blast furnaces of the Inland Steel Co., at Indiana Harbor, Ind. He succeeds James B. McClure, who held this position one week, being promoted from assistant superintendent of blast furnaces on the death of H. Barren. Both Mr. Barren and Mr. McClure died of pneumonia, the latter almost as soon as he took up the work. Mr. Atcherson was born at Columbus, O., in 1880, and, his family moving to California, he completed his education in the west in 1899 and began work in the office of the general superintendent of the Pennsylvania Lines at Columbus, remaining there three years. In May, 1902, he began his blast furnace experience at the Bellaire, O., works of the Carnegie Steel Co., and rose through various positions to the superintendency. Four years and a half ago he was transferred to the Clairton blast furnaces of the Carnegie Steel Co. and remained superintendent there until he resigned to accept his present position.

Calvin P. Wolfe was recently made general superintendent of the Manufacturers' Foundry Co., and the L. J. Mueller Furnace Co., Milwaukee. W. L. Chatfield was appointed superintendent of the casting departments of the two plants.

L. Ashworth of Portsmouth, N. H., who formerly was affiliated with the Cleveland City Forge & Iron Co., Cleveland, in an important capacity, but who latterly has been in the employ of the government, is now manager of the new plant of the Western Drop Forge Co., at 301 Horton street, Seattle.

Charles M. Schwab, director general of shipping and president of the Bethlehem Steel Co., will be a guest of honor at the annual reunion of mayors of Connecticut cities in New London, Conn., May 25. Charles W. Morse of New York will likewise be a guest of honor on this occasion.

H. V. Jamison, advertising manager of the American Sheet & Tin Plate Co., was recently made president of the Pittsburgh Advertising club, to succeed J. C. McQuiston who has served during the past year. Mr. McQuiston is manager of the Westinghouse Electric & Mfg. Co.'s publicity department.

Simon Lake, president of the Lake Torpedo Boat Co., of Maine, Bridgeport, Conn., gave an illustrated talk on "The Modern Submersible, its Development and Possibilities in the Decision of the Present World War," before the electrical engineering society of the Massachusetts Institute of Technology, Cambridge, Mass., May 13.

George B. Hogaboom, New Britain, Conn., has been granted a leave of absence by the Scovill Mfg. Co., Waterbury, Conn., to accept an appointment as electro-plater advisor to the military authorities under the United States bureau of standards at Washington. The position is newly created and does not carry a commission. Mr. Hogaboom is an expert on electro-plating, etc.

William H. Mills resigned recently as president and director of Naylor & Co., 120 Broadway, New York, because of ill health, and has been succeeded by H. Edward Dreier. Other officers follow: A. H. Strong, first vice president; W. H. Pratt, second vice president; Philip L. Smith, assistant to president and Robert F. Ertz, secretary and treasurer.

Graham Macfarlane Jr. has resigned as secretary and treasurer of the Red River Iron Works, Clarksville, Tenn. He has been examined for a liteutenant's commission in the engineers corps, military railway department. At present, he is acting assistant to Lieut. Col. Trask, in Washington, but expects to be assigned to duty in the field in the near future.

Edward Buker, who for two years has been with the Galena-Signal Oil Co., Franklin, Pa., has been appointed western representative of the Rome Iron Mills, Inc., New York City and Rome, N. Y. His headquarters will be the McCormick building, Chicago. He is 33 years old and a graduate of the University of Illinois, with a degree of mechanical engineer.

Prof. John H. Nelson, who six years ago left the Case School of Applied Science, Cleveland, to become professor of strength of materials at the Worcester Polytechnic institute, Worcester, Mass., resigned his position in the bureau of standards at Washington recently. He now is research engineer for the Wyman-Gordon Co., at Worcester.

William Coxe, who was recently appointed supervisor of the privately owned shipyards along the Delaware river by Charles M. Schwab, has been elected a member of the board of directors of the Pennsylvania and New Jersey Shipbuilding Co.'s and the Pusey & Jones Co. Henry G. Barstairs, Baltimore, has been elected treasurer and director of these companies.

M. D. Lucas resigned recently from the sales force of the Stowe-Fuller Co., Cleveland, firebrick and builders' supplies, after 16 years of service. He has opened an office in the Citizens building that city as a representative of the North American Magnesite Co., Ltd., Montreal, Que., manufacturer of clinker magnesite with iron, which is being used by the largest steel manufacturers.

C. P. White, vice president and general manager of the Clarkson Coal Mining Co., Cleveland, with mines in eastern Ohio, has been appointed manager of Lake and Canadian coal distribution by the fuel administration. He formerly was connected with the coal department of the Wheeling & Lake Erie railroad and then spent 20 years in charge of Lake Superior coal dock properties, while located at Duluth, Minn., and Superior, Wis. He was then made general manager of the Pittsburgh Coal Co.'s operations north and west of Chicago, following which he served as vice president of the Carnegie Dock & Fuel Co., with headquarters at Minneapolis.

W. S. Henry has been appointed service engineer of the recently created service department at Rochester, N. Y., of the General Railway Signal Co., New York City, and Fred H. Jones succeeds him as resident manager in charge of eastern territory with offices at 30 Church street, New York. Mr. Jones has been connected with the General Railway Signal Co., since it was organized in 1904 and in the intervening 14 years, has held various important positions, including the resident managerships of the Chicago and San Francisco territories. Mr. Henry has been affiliated with the organization since the formation of the Taylor Signal Co. in 1900.

Iron and Steel Men in War Machine

Benedict Crowell, Assistant Secretary of War

BENEDICT CROWELL is one the half dozen or so names which on the business or production side are counted on most to win the war according to the recent judgment of a high authority. An important part himself of the nation's effective machine for making war, Mr. Crowell is credited with a larger share in bringing its component parts into smooth working order than any other individual. The President with Secretary of War Baker elaborated upon and perfected the reorganization plan for a business regime in conduct of the war at Washington, but its original draft was offered by Mr. Crowell. His was the job of working out the details. When the council of national defense was formed he figured prominently in its deliberations and became associated with the gun division of the ordnance department. His work was included under the functions of the general munitions board, especially in connection with steel production. A civil engineer by profession, he had been commissioned a major in the engineers corps, several months previously and placed in charge of the Washington bureau of the Panama canal, to relieve Lieutenant - Colonel Browne for field service. He resigned this commission when on Nov. 9, 1917, he was appointed assistant secretary of war to succeed Wm. M. Ingraham. When Secretary of War Baker made his recent inspection tour of the front line trenches in France, Mr. Crowell was made acting secretary of war and was in entire charge of that office.

It took Mr. Crowell just about a quarter of a century to reach this important post of authority in the biggest business in the world at the present time. His first position was that of chemist for the Otis Steel Co., Cleveland, the city of his birth in 1870. He had been graduated from Yale in 1891, but took a special course at Case School of Applied Science. He steadily advanced and when he resigned in 1896, he was rolling mill superintendent. He entered business for himself as a chemist and later as mining engineer. Three years later he formed the partnership of Crowell & Peck, which later was dissolved. For several years before his appointment as assistant to Secretary Baker, however, he was a member of the firm of Crowelll & Murray, Cleveland, chemists, and in that capacity became well known to the iron ore trade. He did much analysis work for companies mining and selling Lake Superior ores. With Mr. Murray, he is the joint author of "The Iron Ores of Lake Superior". When called to Washington, he was president of the Crowell-Lundoff-Little Co., large builders and contractors.

BENEDICT CROWELL

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President Wilson in his weekly conferences with heads of important war boards who are not members of the cabinet, follows a plan instituted by Mr. Crowell. For some time, the latter with a group of important men in the war department has made it a practice to call in the military committees of congress for a frank weekly talk, looking toward more effective co-operation.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

War-Time Opinion Favors Big Business

INDICATIVE of the more liberal attitude toward big business in general, the decision this week of the United States Supreme Court in the government's antitrust suit against the United Shoe Machinery Co., is regarded as a highly significant development. This majority opinion dismissing the government's petition gives room for speculation as to the effect on the biggest Sherman law case now pending, namely, the Steel corporation dissolution suit. The following paragraph of the court's opinion in the United Shoe Machinery Co. case is important:

"Considering the remedy prayed, which is extreme, even in its mildest demands, we may ask, what of the investments that have been made during these years of extension and development of the new company's business? How pick out from the new conditions the conditions of 1899 and restore them and the art of that time and rehabilitate the businesses that are alleged to have ceased to exist or to have become merged in the United company."

In this decision the Supreme Court emphasizes the difficulty of dissolving a business of this kind as an argument against such action. It is generally believed thereby a precedent has been established in this, the first antitrust case, to be decided by the Supreme Court, since the United States entered the war.

Dissolution Not Good Business

Enlightening as well as significant is the following section of the opinion: "The idea is repellant that so complete an instrumantality should be dismantled and its concentration and efficiency lost. The United Shoe Machinery Co. indeed has magnitude, but it is at once the result and cause of efficiency and the charge that it has been oppressively used, is not sustained."

That similar statements could be made with reference to the Steel corporation is clear. They would be peculiarly pertinent following the demonstration of efficiency now being given by the Steel Corporation in supplying the government with materials needed in its prosecution of the war. Eight months after the entry of the United States into the conflict Chairman E. H. Gary stated that 80 per cent of the government's requirements were being met by the Steel corporation and 75 per cent of the steel it produced was going to the government. Recent pledges have brought the figure up to 100 per cent. Now the government has appealed to the Corporation to build and operate a great ordnance plant as a further mark of its efficiency and value for National Service.

Steel Corporation Helps Greatly

Last May, when announcement was made through Chief Justice White that the Supreme Court had ordered a re-argument and when the case was postponed, Judge Gary said: "I regret exceedingly the delay incident to a re-argument. However, in the meantime, we shall proceed to enlarge our facilities to meet the requirements of the government to the utmost of our ability." This was soon followed by requests from the government for expansion in many directions including the shell capacity of the Illinois Co., Carnegie Steel Co., and the National Tube Co., involving the expenditure of over $7,000,000. Then followed last week, the government request that the corporation build the huge gun plant on Neville island near Pittsburgh, at a cost of upwards of $50,000,000, which, however, will be defrayed out of national funds.

Three Companies Merge

The Premier Printing Machinery Co., Boston, which has been incorporated under the laws of Massachusetts, is a consolidation of the United Printing Co., the Potter Printing Press Co. and the Whitlock Printing Press Mfg. Co. Offices have been established in New York, Chicago and San Francisco. The United Machine & Press Co., a subsidiary of the Premier Co., has been organized as a sales agent for the Premier Co., the Woonsocket Machine & Press Co., Woonsocket, R. I., the Chapman Electric Neutralizer Co., the Metals Coating Co. of America and the Framingham Foundries, Framingham, Mass. George U. Hatch is manager.

Krupp Earnings Drop

A recent issue of the *Frankfurter Zeitung* gives the approximate earnings for Krupp's works as $20,000,000 for 1916-17, a sharp decline from what they were in the 1915-16 period. A comparative statement follows, marks being worth under normal exchange 23.8 cents in American money:

	1916-17. marks.	1915-16. marks.
Sur. on year's working	89,065,000	95,928,000
Paid in dividends	25,000,000	30,000,000
Written off	88,425,000	90,143,000
Paid in taxes	30,899,000	28,649,000
Placed in reserve	7,048.000	4,482,000
Carried forward	14,679,000	11,002,000

Earns Liberal Rate

The annual report of the Vulcan Detinning Co. shows that in 1917 the company earned $197,643 after all charges except the excess profits tax, an increase of $156,051 in a single year. Deducting taxes of $11,858, the surplus available for dividends amounted to $185,785, equivalent to $12.38 a share on the $1,500,000 preferred stock outstanding.

Financial Crop Ends

Net earnings available for dividends, after charges, for the Charcoal Iron Co. of America, Detroit were $531,553 for the quarter ended March 31, 1918, as against $364,992 in the same period a year ago.

* * *

Decision was recently made by the liquidating trustees of Milliken Bros. Inc., to pay another $10 a share in liquidation on the preferred stock. Payment will be made June 1 to stockholders of record May 16.

* * *

In three Liberty loan campaigns, the Yale & Towne Mfg. Co., Stamford, Conn., has subscribed for $1,300,000; its employes $562,850, a total of $1,862,850. In the third campaign, the

company subscribed for $700,000 worth and 3545 of its 4255 employes bought $246,300 additional, making a total of $946,300.

* * *

The receivers of the Bijur Lighting Co. have been directed by the federal district court of New York to accept the bid of the General Electric Co., made on April 29 for the assets of the company. The purchasing concern agrees to organize a new company, provide $300,000 as working capital, and if necessary an additional $200,000.

* * *

President F. W. Blair of the Charcoal Iron Co. of America, Detroit, stated recently that net earnings after charges, but available for dividends, for the quarter ended March 31, 1918, were $531,553 as compared with $364,992 in the same period a year ago. Unfilled orders on hand March 31, totaled 99,130 tons. Current assets at the end of the quarter were $2,364,651, current liabilities $1,494,565 and surplus $1,935,615.

* * *

Receivers of the Federal Dyestuff & Chemical Co., New York, have been permitted by the federal district court to accept from a committee of note holders headed by Alvin Kreech, not more than $150,000 at any time, to operate its plant at Kingsport, Tenn., so that 9,000,000 pounds of picric acid for the government might be manufactured. The government is to pay 56 cents a pound for the picric acid.

* * *

While smaller profits were shown for the year ended Dec. 31, 1917, by the Steel & Radiation Co., Ltd., Toronto, Ont., a substantial growth in the ordinary business activities of the company is indicated. Sales of heating and steel products totaled $556,306, an increase of $100,000 over 1916. After deducting therefrom the bond interest and other interest charges aggregating $76,035, net profits of $213,516 remained.

* * *

A strong showing was made by the Art Metal Construction Co., Boston, in its earnings for the year ended Dec. 31, 1917. Profits before deductions for bad debts and other special reserves was $532,888 against $297,678 in 1916. This profit is equal to 62.1 per cent on the $857,120 outstanding stock, as compared with 34.7 per cent in 1916. Shipments made in 1917 totaled $3,387,200 in value as against $2,286,000 in 1918.

* * *

Since the Standard Screw Co., New York, changed its fiscal year recently from 12 months ending March 31, to the calendar year, its net profit after depreciation and taxes were deducted for the nine months from April 1 to Dec. 31, 1917, were $1,313,789. After deducting dividends of 6 per cent on preferred "A" stock and 3½ per cent on preferred "B" stock, the balance of earnings on the $2,500,000 common stock was equal to $48.13 per share. Surplus of $728,371 was added to the previous surplus of $6,249,476, making a total surplus of $6,977,847.

Excessive Prices

Charged Against Some Toluol Makers by War Industries Board

New York, May 18.—Members of the toluol division of the war industries board are indignant over what they regard as profiteering by producers of toluol. Some producers have charged as high as $5 to $6 per gallon which the government has permitted them to sell to commercial users. The committee takes the view that inasmuch as it is releasing toluol only for essential commercial uses, producers, in charging exorbitant prices, are taking advantage of the situation. The most important producers are charging for toluol released by the government $2 per gallon at producers' plants for lots of one to 10 drums, and $1.75 for lots of more than 10 drums. The regular price on tank cars to the government is $1.50 per gallon. No more toluol will be released for delivery to commercial consumers during May. It is learned that the amounts released for May equal approximately one-half of the quantities for which applications were made. Applications for toluol for June delivery must be in the hands of the toluol division of the war industries board by May 26. Practically the only releases which were made for May shipment were granted to dyestuffs and pharmaceutical manufacturers.

The phenol market is easier due to larger production and better shipping conditions. Manufacturers of phenol have been able to accumulate a fair spot supply. Spot now is 50 to 52 cents per pound.

The naphthalin market continues exceedingly strong. Producers are behind in deliveries to the extent of several million pounds. Only occasional small spot lots are being sold and are going at 10 to 12 cents per pound.

Sales of benzol do not make a large total, and the market continues easy at 28 to 35 cents per pound at both spot and contract. Solvent naphtha continues strong at 18 to 22 cents per pound for contract and at 18 to 25 cents for spot. The inquiry by the navy department has not yet developed into any business.

Coke Oven By-Products

Spot	
Per Gallon at Producers Plant	
Pure benzol	$0.28 to .35
Toluol (on sales sanctioned by government)	1.75 to 2.00
Solvent naphtha	.18 to .25
Per Pound at Producers Plant	
Phenol	$0.50 to .52
Naphthalin (nominal)	.10 to .12
Per 100 Pounds at Seaboard	
Sulphate of ammonia	$5.55 to 5.60
Contract	
Pure benzol	$0.28 to .35
Toluol	no market
Solvent naphtha	.18 to .22
Per Pound at Producers Plant	
Phenol nominal.	
Per 100 Pounds at Seaboard	
Sulphate of ammonia	nominal

Plans Big Power Plant

Plans for the construction of a steam power plant at a cost of $1,200,000 and work will be started as soon as possible by the McKeesport Tin Plate Co., McKeesport, Pa. President E. R. Crawford advises negotiations with the government for the right to erect a wall 400 feet long and 15 feet high along the Youghiogheny river between the Thirteenth and Fourteenth street bridges, Port Vue, are pending. The site of the proposed power plant is a 7-acre plot adjacent to the mills. The new plant will occupy the plot of ground and it is believed that further additions to the company's tin mills, already the largest of the kind in the world, are contemplated.

President Crawford has announced that the company has purchased twelve 600-horsepower boilers, with stokers, pumps and other equipment for the new steam plant. The company is to make extraordinary efforts to have this plant installed by the middle of November so that it can have the use of it during the coming winter.

Will Supply Charcoal

Erection of a $600,000 hard-wood by-product plant is to be started on at once at Shelby, Ala., a few miles south of Birmingham, by the Shelby Chemical Co., in connection with the blast furnace properties of the Shelby Iron Co., of which Morris Bush is president. The furnaces at Shelby operate on charcoal and coke. Contracts are said to have been closed covering the by-products, wood alcohol, acetone and acetate of lime. The charcoal will be used at the furnaces. The plant is to be completed and in operation by August.

The Electric Furnace Construction Co., Philadelphia, has taken a contract from the navy department for the installation of a 6-ton electric furnace of the Greaves-Etchells type, for installation at the Mare Island navy yard, San Francisco.

Obituaries

EDWARD L. BILLINGSLEA, who was resident partner of Rogers, Brown & Co., Chicago, died May 16 at his home in that city, after being confined but four days. Death was caused by selective toxaemia which followed a stroke of paralysis several days ago. He was born in Maryland, 50 years ago and had been connected with Rogers, Brown & Co., for more than 25 years. He commenced as office boy and clerk in the Cincinnati office and rose to the partnership about 14 years ago by reason of his efficiency and ability. About 20 years ago, he was placed in charge of the Chicago office. Mr. Billingslea was one of the vice presidents of the Iroquois Iron Co., prior to the time it was sold to its present owners and he contributed much to its success. He was well known and highly regarded by iron and steel men everywhere and possessed rare personal traits which won him many firm friends. His honesty of purpose at all times, often was displayed to his own cost in an effort to avoid doing an injustice to others. During recent market complications, his often-expressed wish was to remain on the safe side when any question arose as to duties or responsibilities. He was largely responsible for the development of the Rogers Brown Iron Co. When the company was organized, it immediately commenced to look around for ore fields. Mr. Billingslea made several investigation trips through the ore country. His company became one of the early and prominent holders of territory in the Cayuna range and obtained title to the territory due to his initiative and enterprise. At one time the Rogers Brown Iron Co., was the largest holder on the Cayuna range. It opened the first mine, which subsequently became the most important, the Kennedy mine. For a season or so it was the only operating mine in that territory. In the success of the first foundrymen's convention in Chicago in 1914, Mr. Billingslea was a prominent factor. He had always taken a great interest in the development of the foundry industry in the middle west. He was a member of the Chicago Foundrymen's association and the American Iron and Steel institute as well as many Chicago clubs.

Horace Pratt Tobey, who for nearly 60 years was principal stockholder and chief executive officer of the Tremont Nail Co., Wareham, Mass., and who retired as president recently, died at his home in that city, May 14. He died in the room in which he was born, having lived continuously in the same house for 81 years.

John J. Cummings, who has been president of the McGuire-Cummings Mfg. Co., Chicago, railroad cars and track materials, died in that city on May 4.

Alfred Saeger Weinsheimer, aged 72 years, secretary of the Pullman Co., died May 11 at his home in Chicago. He was born May 12, 1846, at Allentown, Pa., began work as telegraph operator for the Lehigh Valley Co., in 1860, served four years in the quartermaster department during the Civil War and entered the service of the Pullman Palace Car Co. at Chicago in 1871. He remained with this company and its successor, the Pullman Co., until his death.

EDWARD L. BILLINGSLEA

John Jordan Bullock, who formerly served as secretary of the Bullock & Whireard Foundry Co., New York, more recently engaged in advertising work on Chicago newspapers, died of apoplexy May 17 at his son's home in Chicago, aged 68.

J. L. Lanigan, sales representative of the International Molding Machine Co., Chicago, died May 15, at Crouse Irving hospital, Syracuse, N. Y. Prior to becoming affiliated with the International company, he gained a wide experience in the foundry business as a salesman in Ohio, western Pennsylvania and western New York. Due to the intimate knowledge of the foundry business obtained in those years, he became invaluable to the International company as a salesman, making an enviable record in that capacity.

N. V. F. Wilson died May 7, at his home in Pittsburgh. He was well known in steel and engineering circles having located in Pittsburgh and obtaining employment with the Linden Steel Co., many years ago. He later was identified with the Aetna-Standard Steel Co., Bridgeport, O., the Portsmouth Steel Co., Portsmouth, O., and the Western Steel Corp., Irondale, Wash. For a number of years he was district manager at Muncie, Ind., for the American Sheet & Tin Plate Co. He was born in Northumberland, England, 56 years ago. He was a member of the Engineers' Society of Western Pennsylvania.

Charles Skryne Powell, well known electrical engineer, died May 11, at his home in Cleveland and was buried in Cincinnati, May 14. He was 47 years of age. For many years he represented the Westinghouse Electric & Mfg. Co., in Cleveland and in 1902, he was transferred to London, where he assisted in establishing a branch office for the Westinghouse Co. A few years ago he returned to Cleveland to engage in electrical engineering. Mr. Powell was educated at Ohio State university. He was a member of various technical societies and of the Phi Kappa Psi collegiate fraternity. His brother, Thomas C. Powell, vice president of the Southern railroad, is a member of the war industries board.

William Douglass Hyde, for many years a leading steel works' engineer in this country, died May 17 at Brooklyn, in his 88th year. Mr. Hyde, for at least 35 years, was associated with the late Thomas Bray, during which period they built numerous steel plants, and took over and operated numerous plants for the United States Steel Corp. Among the mills which they constructed were the Pittsburgh Steel Works, the Pennsylvania Steel Works and the Elba Iron Works. Mr. Hyde also erected the tube mill at Benwood, W. Va., which now is a subsidiary of the National Tube Co. Mr. Hyde was a member of the naval veterans' association, having served in the United States navy during the Civil war.

Big Problem to Get Ordnance Tools

Second Great Works to be Built by Midvale Steel & Ordnance Co. Will Increase Pressing Machinery Needs to $15,000,000 Says Col. Reed—Small Portion in Sight—Tool Builders Meet

A GRAPHIC outline of the tremendous machine tool needs of the ordnance department set tool builders' ideas awhirl at the annual convention of the National Machine Tool Builders' association, at Atlantic City, N. J., May 16 and 17. Col. H. W. Reed, of the ordnance department, took advantage of the occasion to tell machine tool builders exactly what will be required of them in realizing our gigantic ordnance program. His talk revealed a startling scarcity of heavy tools suitable for making large caliber guns and projectiles. Provision for increasing the capacity for such large tools, he said, is a responsibility which the ordnance department expects the machine tool industry to shoulder. The necessities of the government are such, Col. Reed said, that no machine tool plant can be permitted to slow up production because its particular product is not badly needed. The time has arrived when manufacturers must abandon old lines and make the tools needed by the government.

In order that the needs of the government may be met, close contact between the machine tool builders and the machine tool section of the war industries board is imperative. Col. Reed also reminded his hearers that it is imperative that machine tool builders maintain their engineering service departments, which, due to present conditions, in many cases have been neglected. Many contracts are being let by the government to people who have had very little experience in the kind of work called for. Hence, they need help and advice as to what tools to buy and how to do the work. As an illustration of the pitfalls which beset many government contractors, he mentioned an instance where a company recently was on the point of buying more than 100 lathes for which it had no use. Furthermore, Col. Reed said that profiteering is not to be tolerated and he asked the aid of the machine tool builders in stifling any tendency toward asking outrageous prices.

As an illustration to the extent to which large tools will be needed, Colonel Reed enumerated the requirements of the large government cannon and projectile plants which are to be built by the United States Steel Corp., near Pittsburgh, and the Midvale Steel & Ordnance Co., near Philadelphia. For these plants, approximately $10,000,000 worth of large tools will be needed initially, while $5,000,000 worth of all kinds of tools must be purchased later. At the present time, the ordnance department knows where it can buy only about $1,500,000 worth, leaving $13,500,000 worth to be provided for. Colonel Reed read a list of nearly 600 large tools which will be required for these plants. It is possible that even double this number of large tools will be required, he said; the exact requirements will be known in two or three months. In addition to the requirements of the two ordnance plants, Colonel Reed said that $5,000,000 to $10,000,000 worth of small tools for making pistols and rifles will be needed. No difficulty is anticipated in getting these particular tools. In addition, a huge amount of machinery for making small arms ammunition must be purchased. In fact, the present small arms ammunition capacity of the country must be more than doubled.

THE appalling shortage of skilled labor in this country was revealed in a paper by H. E. Miles, chairman of the section on industrial training for the war emergency of the council of national defense, whose paper was entitled "Women in Industry". Figures showing the number of men who apply for jobs as skilled workers are exceedingly misleading, since very few of the applicants measure up to requirements. Of 10,868 skilled men who applied for jobs in Massachusetts in one month, only 1200 were found to be competent machinists. Of 8000 skilled men who applied for work in another state during one month, only 172 proved to be dependable machinists. It has been demonstrated that only one of 10 applicants for work in which skill is required, are really skilled men. It, therefore, is necessary in order to provide workers in the immense numbers that will be needed to train them for the jobs they are to fill. Mr. Miles said that good instruction is most difficult to secure and he enumerated instances where, by careless instruction, learners absorbed more undesirable than good methods. Good results have been obtained in recruiting the ranks of the teachers in certain trades from allied trades. By this system, machinists have been given charge of the training of patternmakers and patternmakers have been charged with the training of machinists. By giving a skilled man charge of training in some line in which he is not daily occupied, he is found to exercise more patience and attention to details, with the result that the learners become proficient in a much shorter period of time.

Women Workers Excel Men

Mr. Miles recommended the employment, on a large scale, of women in the machine tool industry. He mentioned numerous instances where women have far eclipsed the records of the men. For instance, in a certain shop in this country a girl made $9 a day almost from the start because a man who operated the machine before her had satisfied his employers that $5 worth of work was all that could be produced. In another shop girl operatives turned out work in one 9-hour shift that had required two shifts of men. At a certain shop in Dayton, O., male workers turned out 20 pieces per hour of a certain fuse part. Owing to dissatisfaction with the piece rate, the men practiced various methods of curtailing output, such as putting oil on the belts, and the production accordingly dropped to 12 per hour. Realizing that emphatic measures must be taken, the company trained women in this work. The latter almost from the beginning produced at the rate of 25 pieces per hour and later raised the output to 55. Mr. Miles illustrated his talk with numerous slides which showed that women are doing even the heaviest work satisfactorily and without physical deterioration. These slides showed particularly the work that is done by women in England, who in countless cases are setting up their own tools and doing work to very

close tolerances as inspection showed.

One of the principal causes for the higher rate of production which in many cases is being attained by the women in the machine shops in this country is the dissatisfaction which exists among the men owing to piece rates. They have found that it is customary after their total pay exceeds a certain figure, for their employers to reduce the piece rate. Therefore, feeling that there is a limit to the amount of pay they may receive, they are anxious to obtain the highest possible figure for the smallest amount of work. The remedy for this evil is the adoption of intelligent methods for computing piece work rates. These should be established as a result of careful investigation, after which the men should be informed that the rates will not be changed during the period of the war. Such a system, he thought, would result in stimulating output. A well informed New England machine tool builder, Mr. Miles said, stated that the machine shops of New England are only 70 per cent efficient. This showing is due almost entirely to dissatisfaction with piece rates. As opposed to this condition in New England, Mr. Miles spoke of numerous machine shops in England, where women employes predominate, which, on the same comparative basis, are 125 to 200 per cent efficient.

Austin Babcock, of the Guaranty Trust Co., New York, spoke on the problems which will confront business in this country after the war. In the midst of carrying out our obligation of winning the war, we must prepare for peace, and however far off peace, may be, its known problems are so important as to require immediate attention. In fact, it is only by looking ahead toward peace that we can appreciate the real significance of the past four years, and realize what is involved by the expenditure of about $100,000,000,000 for making war. One vital effect of the war has been the stimulation of development of resources in all countries, and the speeding up of commerce and production. Another vital effect is the control which governments have assumed over commerce and industry. In this country the government has clasped hands with business in a manner which indicates a pronounced paternalistic policy for the future.

A great danger to our future, said Mr. Babcock, is that we generally do not appreciate the efforts which our allies will make to reorganize their foreign trade after peace comes. In all of their present plans for the future, foreign trade is the keynote, since it is only by selling products abroad that they can hope to pay their debts. Fortunately, our method of financing the war, like that of our allies—by heavy taxation and borrowing, does not mortgage our future to the same extent as in the case of Germany, which is relying largely upon loans and only to a very small extent upon taxation. It also is fortunate for us that after the war we shall have a merchant marine for carrying our products to all parts of the globe. It is vitally important, however, said Mr. Babcock, that the restrictive legislation hindering our maritime power be repealed and replaced by laws more favorable toward maritime development.

Reasonable Prices Called For

At his opening address at the convention of the National Machine Tool Builders' association, President J. B. Doan said that advances in machine tool prices, despite the greatly increased costs of production, have been modest. It is the duty of the machine tool builders to keep their selling prices within bounds of reason, he said, and to help the country at this time by quoting prices which embody only a legitimate profit. Mr. Doan deplored all ill founded criticism of the government at this time, saying that this accomplishes more harm than good. He especially warned against criticism of delays unless the full circumstances are known. For instance, he said, the criticisms of the execution of the aircraft program are due to lack of appreciation of the amount of time which of necessity is required in preparing for the manufacture of aircraft on a large scale.

Admiral R. S. Griffin, engineer-in chief, United States navy, congratulated the association on the fact that while prices now naturally are high, he could not remember a single case where a machine tool builder asked an exhorbitant figure of the navy department. He regretted, however, that he could not say the same of all machine tool dealers. Such quotations have not proved harmful, as where the price was considered too high, the navy department has commandeered the tool.

"Just now we are too busy, but some day there is going to be an accounting," said Admiral Griffin. "We want our record clean and we will not permit any profiteering. Anybody guilty of profiteering is sure to hear about it after the war." Admiral Griffin stated that the navy department does not contemplate any large requirements and has only routine purchases in sight. He emphasized the necessity, however, of making quick deliveries on all orders from the navy department.

Following Admiral Griffin's address, President Doan, of the association, rose to a defense of the machine tool dealer. Although a few dealers have not been in line, they have been marked exceptions, said Mr. Doan, as most of the dealers have exhibited a consistently patriotic attitude. He voiced the willingness of the association to subordinate all other requirements to those of the government, and he expressed it in line with the association's ideas for the government to exercise its right of commandeer in all cases where there is a tendency to demand outrageous prices.

Charles T. Foster, vice president of the American Radiator Co., and assistant commissioner of priorities, stated that the machine tool industry has been placed on the fuel preference list, so that in case of a fuel shortage next winter, machine tool builders will be among the users whose plants will be kept going. Mr. Foster described the great scope of the work of the priority committee and he explained that in directing this work, the committee is actuated solely by necessities of our government and its allies. The committee does not want to run anybody's business, and in order to prevent mistakes, is desirous at all times of receiving suggestions and complaints. The work of the committee, Mr. Foster said, serves to simplify the problems of manufacturers. For instance, the army and navy departments and Emergency Fleet corporation have agreed not to exercise their right of commandeer until they have given the priority committee an opportunity to secure the material they want. As a result, a great deal of industrial disturbance which the general exercise of the right to commandeer would entail, has been eliminated. Mr. Foster requested that all manufacturers and government contractors leave questions of priority entirely to his committee and that they establish no priority agreements of their own, as these serve to complicate the priority committee's work.

In an inspiring address about the war, Isaac F. Marcosson warned the machine tool builders against optimism. The Germans never before were as strong as they now are, while the situation of the allies never has been so uncertain. The principal obstacle toward allied successes, he said, has been the diliatory policy which has been pursued. On all fronts the allies hitherto have been too late. Haste in executing our own war program, therefore, is vital, and he exhorted the machine tool builders to

remember that theirs is a basic industry and that each day lost in production and in making deliveries is a blow to the allied cause. Mr. Marcosson said that in his trips abroad he found indisputable evidence that the Germans are preparing to make use of Spain, Holland, Russia and Switzerland in regaining their foreign trade after the war. Therefore, goods made in these countries should be viewed with suspicion. Mr. Marcosson dwelt upon the deplorable effects of pro-Germanism in neutral as well as belligerent countries and he urged the harshest treatment of German propagandists here.

Urges Adoption of Trade Acceptance

Maurice T. Fleisher, of Philadelphia, characterized the trade acceptance as a commercial instrument which is as beneficial in its workings as an improved tool which makes it possible to increase production at lessened expense. He explained the use of the trade acceptance and urged its general adoption.

The Becker Milling Machine Co., Hyde Park, Mass., and the Defiance Machine Co., Defiance, O., were elected to membership in the association. The resolutions committee at the convention consisted of O. B. Iles, chairman; E. M. Woodward and Charles H. Alvord.

At an executive session held Friday morning, the association was addressed by George Merryweather, of the machine tool section of the finished products division of the war industries board and by H. W. Dunbar, of the Norton Grinding Co., who spoke on "Safety Devices on Machine Tools".

Prices for Car Castings Are Fixed

WASHINGTON, May 21.—In agreeing on fixed prices for malleable castings for cars, the United States railroad administration officially recognizes the importance of malleable iron to the great government car-building program. The new fixed prices, which are shown in detail in the accompanying table, were agreed upon by a subcommittee of the general advisory railroad purchasing committee and a committee of malleable casting manufacturers who met in Washington on May 15. The railroad administration's subcommittee consisted of H. C. Pearce, of the Seaboard Air Line; W. G. Phelps, purchasing agent, Pennsylvania Lines West, and W. C. Bower, purchasing agent, New York Central railroad. The new price schedule has been approved by the American Iron and Steel institute. Under its provisions thousands of tons of malleable castings will be ordered for the 100,000 railroad freight cars to be built for the government. Malleable iron castings have always occupied a prominent place in the railroad car construction and the recent announcement made by the subcommittee representing the railroad administration in this particular case is as follows:

"Orders are to be placed by the car company at prices quoted today with the understanding that these prices are to be reviewed by the war industries board. If that board finds these prices too high, it will revise them, revised prices to apply on all orders, and any excess made to be refunded to the railroad administration."

The approval of the prices by the iron and steel institute, however, makes it certain that no changes are contemplated at the present time, and the new schedule will stand as issued until further general price revisions are in order.

Prices for steel castings also have been agreed upon by representatives of the manufacturers and the railroad administration. The detailed figures are presented in the accompanying table.

Fixed Prices for Car Castings

MALLEABLE CASTINGS

Miscellaneous Freight Car Castings

Quantity ordered	Under 25 pcs.	26 to 100 pcs.	101 to 250 pcs.	251 to 500 pcs.	Over 500 pcs.
Draft lugs	8.90c	8.00c	7.35c	7.15c	7.00c
Journal box wedges	8.90c	8.00c	7.35c	7.15c	7.00c
Spring seats	8.90c	8.00c	7.35c	7.15c	7.00c
Striking plates	8.90c	8.00c	7.35c	7.15c	7.00c
Truck columns	8.90c	8.00c	7.35c	7.15c	7.00c
Rail braces	8.90c	8.00c	7.35c	7.15c	7.00c
Center plates	9.00c	8.10c	7.40c	7.25c	7.10c
Center plate supports	9.00c	8.10c	7.40c	7.25c	7.10c
Center sill separators	9.00c	8.10c	7.40c	7.25c	7.10c
Coupler carriers	9.00c	8.10c	7.40c	7.25c	7.10c
Push pole pockets	9.00c	8.10c	7.40c	7.25c	7.10c
Side bearings	9.00c	8.10c	7.40c	7.25c	7.10c
Back stop castings	9.05c	8.15c	7.50c	7.35c	7.20c
Bolster center fillers	9.35c	8.45c	7.75c	7.60c	7.45c

All Other Miscellaneous Freight Car Castings

Quantity ordered	1 to 5 pcs.	6 to 25 pcs.	26 to 100 pcs.	101 to 250 pcs.	251 to 500 pcs.	Over 500 pcs.
Under 2 lbs.	26.25c	21.25c	17.00c	12.50c	11.00c	10.25c
From 2 lbs. to 7 lbs.	21.25c	17.00c	12.25c	10.25c	09.75c	09.25c
Over 7 lbs. to 15 lbs.	14.75c	11.50c	10.25c	09.25c	08.75c	08.50c
Over 15 lbs. to 25 lbs.	12.25c	10.75c	09.75c	08.75c	08.25c	08.00c
Over 25 lbs.	11.50c	10.25c	09.00c	08.50c	08.00c	07.75c

All orders subject to above prices.

Above prices are f. o. b. foundry with car load of freight allowed to points within the territory bounded by the Mississippi river on the west, and the Ohio and Potomac rivers on the south. Car load rate of freight only to boundary will be allowed on shipments to points outside of the above territory.

Any pattern equipment necessary to be furnished by or at the expense of customer.

Any castings of intricate design or necessarily of very light section will be charged extra as will be hereafter agreed upon.

STEEL CASTINGS

Name of castings or division of weight	Under 50 castings	50-249 castings	250-499 castings	500 castings and over
Bolster center fillers	11.25c	9.95c	9.05c	8.60c
Center plates	10.25c	9.25c	8.25c	7.95c
Draft lugs	10.25c	8.95c	8.20c	7.80c
Journal box wedges	13.25c	11.60c	10.60c	10.05c
Push pole pockets	10.25c	8.95c	8.20c	7.80c
Roping and jacking castings	13.25c	11.60c	10.60c	10.05c
Side bearings	13.25c	11.60c	10.60c	10.05c
Striking castings	10.25c	9.25c	8.25c	7.95c
Other castings ½ pound	22.75c	20.05c	18.15c	17.40c
Other castings ¾ pound	18.75c	16.55c	15.05c	14.25c
Other castings 11/25 pound	15.40c	13.55c	12.25c	11.75c
Other castings 26/50 pound	12.75c	11.25c	10.25c	9.75c
Other castings over 50 pounds	10.75c	9.40c	8.60c	8.15c

Patterns extra, unless 500 or more castings are ordered from one pattern at a time.

Enormous Tool Demands in Sight

Heavy Ordnance Plants and Railroad Requirements Combined Will Furnish Unprecedented Purchases in the Near Future—Manufacturing Facilities Will Be Taxed to Meet the Machinery Needs Now Impending

EVERY indication points to an unparalleled demand soon in machine tool lines. With the construction of the Neville island ordnance plant for the Steel corporation and a similar undertaking by the Midvale Steel & Ordnance Co., heavy equipment will be required in great quantities. It is estimated by the ordnance department that over $10,000,000 worth of heavy machinery will be needed on these projects, while almost $5,000,000 of miscellaneous tools will also be required. Extensive railway lists are also making their appearance, and new requirements are expected within a few weeks. Director McAdoo has announced budgets amounting to $479,686,531 for equipment, $440,071,013 for additions and betterment, and $18,203,774 for extensions for the railroads, chiefly those engaged in carrying war materials. These expenditures obviously will carry large machine tool requirements. Actual inquiries during the past week have been light, and have indicated the low point of the curve preceding the stupendous business now in sight. In the central west, a few odd war contracts have made their appearance carrying, however, only replacement orders for tools. A feature of interest in the Chicago district is the appearance of some small arms or more properly cutlery work for the ordnance department. This initial order for a new type of knuckle knife for trench use, coming at the same time with some orders for heavy shells is a mark of the diversity of requirements to come in the western machine tool market. As noted a few weeks ago, the Japanese government has been in the market for a large list of machinery for naval and shipbuilding work. Difficulty has been experienced, for reasons based on the shortage of some lines of tools, and the Japanese importers are still asking for large lathes, drills, grinders and planers. S. Noda, president, Roku-Roku Shoten, Ltd., Tokyo, Japan, has recently been making inquiries in Canada with a view to purchasing machinery. Chinese importers are also asking for tools for use in the Orient. The crane situation is improving rapidly. Shipbuilding continues increasingly active.

Ordnance Needs Will Side-Track Nonessentials

A STARTLING shortage of heavy machine tools for making guns and projectiles of large caliber now dwarfs all other phases of the equipment market. The vast machine tool requirements of the government's gun and projectile program for the first time were defined at the annual convention of machine tool builders at Atlantic City last week. According to Col. H. W. Reed, who addressed the convention as a representative of the ordnance department, a minimum of $10,000,000 worth of heavy tools will be required initially for the two huge ordnance plants to be erected at Neville island, near Pittsburgh, by the United States Steel Corp., and at a site near Philadelphia, by the Midvale Steel & Ordnance Co. In addition to the $10,000,000 worth of heavy tools, some $5,000,000 worth of miscellaneous tools will be required for these plants.

Of the entire $15,000,000 worth, Colonel Reed stated, only $1,500,000 worth of these tools is now in sight. The remainder must be provided for. He put squarely upon the shoulders of the machine tool builders the responsibility of furnishing these tools. They must not only extend their plants, but must abandon, at least temporarily, the production of less essential tools for those the government now needs. He stated that approximately 600 heavy tools, a list of which is given on page 1338 in this issue, would be needed for the Neville island and Philadelphia plants during the coming months. This number of tools he gave as the minimum; as a matter of fact, he said the number might be doubled. The exact requirements will be determined in the next two or three months.

A large inquiry to come out in the eastern market during the past week is that of the Wright-Martin Aircraft Corp., New Brunswick, N. J. This company, which recently closed on about $900,000 worth of tools, is now asking bids on about $400,000 or $500,000 worth of additional equipment for its newly purchased plant at Long Island City, N. Y. Demand from railroads continues to come out in better volume, several sizable lists now being before the market. In addition to the Santa Fe and the Chicago, Burlington & Quincy, the latter of which is now placing business, the Central railroad of New Jersey, the New York Central and the Erie have issued lists calling for from 50 to 100 tools. The Baltimore & Ohio is also understood to be in the market. As yet manufacturers of railroad equipment have not come into the market on an extended scale, although demand from these interests is steadily increasing. Prices on machine tools generally are strong and during the past few days a leading builder advanced quotations on turret lathes and screw machines 15 per cent.

Tool Inquiries from the Orient

A feature in the transactions of the week is the purchase of a number of miscellaneous tools for export to Japan. Another prospective purchaser of tools for the Orient is L. I. Ying, an engineer of the Chinese ministry of war. He is in this country for only a short time and is making his headquarters at the Chinese consulate, 18 Broadway, New York. The Standard Oil Co. of New York is expected to close this week on a large amount of tank shop equipment for its new plant at Providence,

AGATHON STEELS

AGATHON STEELS TRADE MARK

Splendid examples of the ingenuity which has made modern alloy steel manufacture possible are the huge charging machines which charge the open-hearth furnaces. Controlled from the cab at its side, this almost-human machine accomplishes in a few minutes an operation which formerly took hours of toilsome labor.

By the installation of modern electrically-operated machinery throughout our plant, we have not only been able to keep abreast of the demand for Agathon Alloys, but we have also secured added impetus toward the realization of our ideal—Perfection.

The Central Steel Company

Massillon, Ohio, Agathon City

SALES OFFICES:

Detroit Office: 326-27-28 Ford Bldg. F. Walter Guibert, District Representative.
Cleveland Office: Hickox Building. The Hamill-Hickox Company, District Representatives.
Chicago Office: 1370 People's Gas Bldg. 122 S. Michigan Blvd. C. H. Beach, District Representative.
Philadelphia Office: 603 Widener Bldg. Frank Wallace, District Sales Manager.
Syracuse Office: 621 University Blk. T. B. Davies, District Sales Manager.
J. E. Dockendorff & Co., 20 Broad St., New York, General Export Agents.

AGATHON
Alloy Steels

"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Special Analyses
"AGATHON" Vanadium
"AGATHON" Chrome Steel
"AGATHON" High Carbon

R. I. The Robbins Drydock & Repair Co., Brooklyn, is inquiring for a few tools. The navy department is asking for equipment for its yard at Portsmouth, N. H.

The Nathan Mfg. Co., which has a government contract for the manufacturers of valves, has recently purchased some equipment for its 106th street plant, New York. The Vulcan Iron Works, Jersey City, N. J., which is building a new boiler shop, will issue a list in about two weeks. The Foundation Co., New York, is also expected to be a large buyer shortly. The Morse Drydock & Repair Co., Brooklyn, has recently bought additional equipment for its new forge shop. The Chevrolet Motor Co. is erecting a large addition to its plant at Tarrytown, N. Y., for which equipment will be needed. The Cresson Morris Co., Philadelphia, will build a $35,000 foundry.

Increasing Crane Demand Noted

Demand for cranes continues more active, several large inquiries being before sellers. The Westinghouse, Church. Kerr Co. is inquiring for 10 electric cranes for the Baltimore & Ohio shops, at Glennwood, Pa. Specifications call for two 100-ton cranes, with 87½-foot span; one 30-ton, 39-foot; 15-ton, 57-foot; 15-ton, 50-foot; 15-ton gantry; and four 3-ton traveling jib cranes. The Sun Shipbuilding Co., in addition to the 25-ton traveling crane recently noted, is in the market for one 35-ton, one 10-ton, one 5-ton and seven 15-ton traveling cranes. The American International Shipbuilding Co., Philadelphia, is inquiring for two 10-ton traveling cranes for its plant at Hog Island. Two 10-ton travelers are to be bought by the Ingersoll-Rand Co. for its plant at Phillipsburg, N. J. The New Britain Machine Co., New Britain, Conn., which recently increased its capital stock from $1,250,000 to $1,500,000 for further plant expansion, is now in the market for two traveling cranes of 5 and 10 tons capacity. The Bethlehem Steel Co. is inquiring for one 10-ton bucket crane, 18-foot span, for its plant at Sparrows Point, Md. The Merchant Shipbuilding Co., 165 Broadway, New York, has just bought a 15-ton gantry crane, and is now in the market for two or three gantry cranes of similar capacity. The Virginia Shipbuilding Co., Alexandria, Va., is expected to close shortly on two 7-ton cranes, 76-foot span. The Thompson-Starrett Co., New York, is inquiring for several locomotive cranes. The Morse Drydock & Repair Co., Brooklyn, has recently purchased a 20-ton crane from the Northern Engineering Works, Detroit. The William Cramp & Sons Ship & Engine Building Co. has bought four 10-ton traveling cranes, 106-foot span, for which inquiries were issued several weeks ago. The Cramp company has still to act on the list of 18 cranes more recently issued.

Munitions Work Stimulates Chicago Market

ASIDE from continued large demand for single tools from miscellaneous sources, the machine tool industry in Chicago is receiving heavy inquiry from concerns which have taken or are preparing to take contracts for munitions. This includes hand grenades, 155-millimeter shells and also a new sidearm. Distribution of these orders is stimulating demand for small lathes and sensitive drills, a considerable order for which was filled during the present week for a Wisconsin manufacturer of hand grenades, and grinders and heavier lathes for larger shells. Among those interested in the hand grenade contracts is the International Harvester Co., which is inquiring for punch presses and small lathes. The new sidearm is said to be different from the knives or swords formerly carried, having a steel blade of triangular section, 14 inches long, with needle point and keen angles. The first contract is said to be for 100,000 with others to follow until the entire overseas force is equipped. This will require grinders and special machinery for making the hilts, which are somewhat similar to brass knuckles. On most government munition contracts, four months are allowed for equipping, ready for production, and dealers have been able for the most part to promise machinery within that time. The Chicago, Burlington & Quincy railroad has placed orders for most of its recent inquiry, especially for standard machinery requiring no special investigation and is now going over the remainder of the list, which probably will be placed shortly. It is said this road has adopted the policy of paying on receipt of invoice, instead of the former method of sending invoices through complicated red tape, which usually produces delay. The Invincible Blow Pipe Co., Chicago, is building a two-story factory. The Sanitary District of Chicago is taking bids on a sewage pumping station and its equipment. The Jackson Milling Co., Grand Rapids, Wis., is preparing to build a hydro-electric plant at Stevens Point, Wis. The Consolidated Press Co., Hastings, Mich., is having plans prepared for a gray iron foundry.

Inquiry is Light in Pittsburgh

INQUIRIES in the Pittsburgh district for machine tools are not numerous. Steel mills which have been running as fully as conditions permitted for almost three years are expected to be forced into the market for new equipment before long to replace that which has had to stand exceptionally hard wear and tear without being given the necessary attention for repairs. Makers of machine tools report that practically all business is for the government either direct or indirect and that it is impossible to get steel for any other purpose. Machinery and machine tool builders will be called upon to furnish a vast quantity of equipment for the big ordnance plant to be built by the United States Steel Corp. on Neville island in the Pittsburgh district for the government. Large hydraulic presses, lathes, boring machines, cranes, drills and motors will be among the demands which will be made for this plant.

Market Remains Quiet in Cleveland District

INQUIRIES were spasmodic in the Cleveland district during the past week. A few manufacturers have inquired for small lots of equipment but little real activity was evident. Buying for private commercial ends is almost nonexistent as a feeling prevails that the machine tool resources of the entire country will be severely taxed when the full weight of the impending shell and ordnance work descends. Some surprise has been expressed by dealers who have had orders for machinery for shipyard use, that a higher class priority has been given in some cases to the same equipment wanted for arsenals. Deliveries of large lathes, vertical boring mills and heavy drill presses remain slow, but smaller machinery in most cases can be had promptly. The New York Central railway has an extensive tool list under consideration, which will be issued within the next week or two. The Lake Erie & Western has replaced with used tools and a few machines from stock, the equipment which was destroyed by a recent fire at Lima, O. The Nickel Plate railroad has withdrawn its inquiry which was issued a few weeks ago, and contemplates buying only occasional machines in the near future. The Gent Machine Co., Cleveland, desires two small screw machines and two small lathes. The Electric Materials Co., Northeast, Pa., is inquiring for two 3-spindle drills. The Lakeside Forge Co., Erie, Pa., will purchase a 30-inch lathe, die sinker and a 24 to 30-inch shaper. The Cleveland Pneumatic Tool Co., Cleveland, is building a plant addition.

DOING YOUR "BIT" with ROLLING MILL JIM

Say Fellows! D'you know that there have been quite a few Marine engines for the wooden boats delivered to the Government, and castings in the first engine delivered were "HUBBARD" castings?

Believe me! They are there on deliveries. Try 'em!

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

These Machines Are Needed by the Ordnance Department

Quoting G. E. Merriwcather, chairman of the machine tool section of the war industries board, Col. H. W. Reed stated the present requirements of the ordnance department for machine tools as follows:

COMBINATION BORING AND TURNING LATHES

Size	Quantity
85 inches x 50 feet	16
75 inches x 50 feet	6
52 inches x 30 feet	2
72 inches x 50 feet	15
52 inches x 50 feet	2
72 inches x 20 feet	5

VERTICAL MILLERS

No. 6	2
No. 5	8
No. 3	2
No. 4	2

TURNING LATHES

36 inches x 6 feet	2
60 inches x 6 feet to 26 feet	17
54 inches x 6 feet to 24 feet	29
70 inches x 50 feet	8
72 inches x 30 feet	22
85 inches x 50 feet	10
60 inches x 50 feet	4
48 inches x 30 feet	5

PLANERS

48 inches x 12 feet	12
72 inches x 16 feet	10
60 inches x 14 feet	5
48 inches x 14 feet	6
36 inches x 12 feet	25
96 inches x 24 feet	5
120 inches x 30 feet	14
64 inches x 24 feet	8
42 inches x 16 feet	3
120 inches x 24 feet	1
72 inches open side	4

HORIZONTAL BORING MILLS

4 inches	29
5 inches	6
6 inches	5
3 inches	3

SLOTTERS

36 inches	6
30 inches	1
24 inches	5
12 inches	6
48 inches	3
14 inches	8
26 inches	11
10 inches	3
18 inches	3

RADIAL DRILLS

6 feet	8
5 feet	13

BORING LATHES

54 inches x 12 feet to 22 feet	28
40 inches x 50 feet double end	5
50 inches x 25 feet double end	18
40 inches x 25 feet	8
32 inches x 25 feet double end	1
72 inches x 30 feet	2

FLOOR BORING MILLS

7 inches x 7 feet	3
7 inches x 5 feet	2

VERTICAL BORING MILLS

14 feet	1
20 feet	8
12 feet	1
10 feet	5
48 inches	8
72 inches	7
66 inches	3
90 inches	8
60 inches	11
50 inches	3
96 inches	1
Special	3

RIFLING MACHINES

50 feet	3
30 feet	2

MILLING MACHINES

6 inch spindle, horizontal	4
No. 6 vertical	7
No. 5 vertical	6
No. 3 unfversal	2
No. 5 universal, horizontal	2
No. 4 plain	3
No. 4 universal	3
No. 3 plain	6

MISCELLANEOUS

48 inch gap lathes	18
60 inch gear cutters	3
24 inch gear hobbers	2
24 inches x 8 feet grinders	3
72 inch gear cutters	3
Draw shapers	2
No. 4 gear cutters	1
No. 5 gear cutters	3
16 inches x 50 inches grinder	1
10 inches x 72 inches grinder	1
18 inch rotary saw	1
26 inch shapers	3

RECAPITULATION OF TOOLS FOR WHICH A SCARCITY EXISTS

Boring lathes	$1,239,000
Turning lathes	1,747,000
Combination boring and turn'g	1,535,000
Radial drills	83,000
Milling machines, general	165,000
Milling machines, vertical	33,000
Milling machines, horizontal	306,000
Vertical boring machines	1,150,000
Horizontal boring machines	306,000
Slotters	332,000
Planers	2,118,000
Rifling machines	146,000
Floor boring machines	52,000
Miscellaneous	170,000
Total	$9,382,000
Balance, value available tools	924,000
Total estimated cost	$10,306,000

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

ABINGTON, MASS.—A $100,000 addition, one story high, 40 x 130 feet, will be built by the Liberty Mfg. Co., of which William Marsh is president.

BOSTON.—The Panco Mfg. Co. has been incorporated with $200,000 capital by William J. Saunders, M. Mackay and Frank B. Locateli, of Somerville, Mass.

BOSTON.—The Federal Construction Co. has been incorporated with $50,000 capital by Robert Hamilton, George Barry and John J. Moore, Milton, Mass.

BOSTON, MASS.—Bids close May 20 for a fireproof 10-story, 180 x 180-foot, storehouse and a 2-story addition to the present warehouse, to cost $950,000, for the government at the Charleston navy yard.

BOSTON.—Densmore & LeClear are receiving bids on the construction of a 3-story, 80 x 160-foot plant for the Mason Regulator Company.

BOYNE CITY, MICH. — Frank Kedan, John Bergy, W. L. Martin, W. S. Shaw and Wm. Rapelin have incorporated the Boyne Traction Motor Co., for $75,000. A plant now is being equipped.

HUDSON, MASS.—The Universal Boring Machine Co. has abandoned the plan of building a 1-story, 40 x 100-foot addition to its plant.

NORTH ANDOVER, MASS.—The Davis & Thurber Machine Co. will make alterations to its forge shop, costing $20,000.

PORT HURON, MICH.—The Foundation Co. has absorbed the Reid Wrecking Co. drydock and shipbuilding plant. The plant will be enlarged and keels laid for 10 steel trawlers, 150 feet long.

PORT HURON, MICH.—The plant of the American Machine Corp. was damaged by fire with a loss of $200,000. The fire started when heated shell cases were dipped in an oil bath. The plant will be rebuilt.

SAGINAW, MICH.—Wickes Bros. pattern shop were damaged by fire with a loss of $10,000. They will be rebuilt.

SOMERVILLE, MASS. — The Cambridge Color & Chemical Co. has been incorporated to do manufacturing with a capital of $100,000, by William T. Beattie, K. L. Beattie and A. M. Gorham, Watertown, Mass.

SPRINGFIELD, MASS. — A permit has been issued to the United Electric Light Co. for a brick, steel and concrete, 3-story, 110 x 60-foot, switching station to cost $102,000, at the foot of State street.

WORCESTER, MASS.—The New England Power Co. will build a brick, 2-story and basement, 40 x 70 foot, office building to replace the one damaged by fire recently.

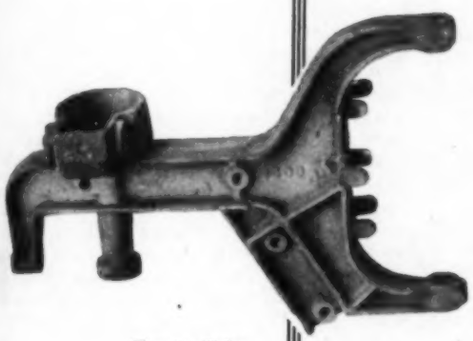
PAWTUCKET, R. I. — The Narragansett Machine Co. is making alterations to its place.

Steering Arms

Small Castings for Dependable Service

We specialize in small castings of unusual resilient qualities for the construction of AUTOMOBILES, MOTOR TRUCKS, TRACTORS and MACHINE TOOLS.

FARRELL-CHEEK CASTINGS



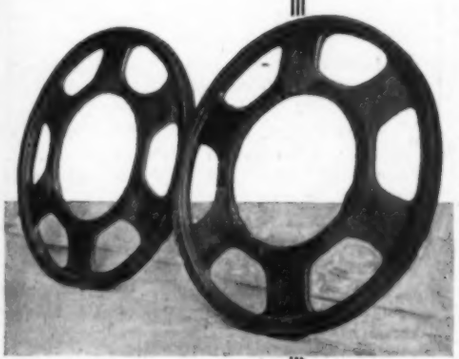
Tractor Yoke

are helping to establish reputations for safety and endurance for the products of many of the largest manufacturers in the country.

FARRELL-CHEEK CASTINGS are particularly adapted to their purpose because they are made after an analysis formulated especially for light castings of high resilience.

We also manufacture BLANK GEARS; Carbonizing Boxes; and Case Hardening Boxes.

Let us know your requirements.



Gear Blanks

Farrell-Cheek Steel Foundry Co.

SANDUSKY, OHIO

Branch Offices

NEW YORK PHILADELPHIA CHICAGO

Say you saw it in THE IRON TRADE REVIEW

DANIELSON, CONN. — The Assanaga Woolen Co. is to build a 94 x 194-foot addition to its mill.

NEW BRITAIN, CONN. — The Stanley Works will build a hollow tile 1-story, 31 x 43-foot building, to be used as an office for the hot rolling plant.

NEW BRITAIN, CONN.—The North & Judd Co. will build a brick 20 x 21-foot furnace building and two 20 x 120-foot and 20 x 80-foot storage buildings.

NEW LONDON, CONN.—Bids close May 20 for a wood, 35 x 321 x 41 x 51 foot pier and a 13-foot high steel frame, metal covered storage shed to cost $65,000, for the government.

STAMFORD, CONN.—The H. & H. Foundry, 778 Pacific street, plans the erection of another building, to be used as a steel foundry.

Along the Middle Atlantic Seaboard

ALBANY, N. Y.—The Machine Tool Engineering Co. recently was incorporated by L. S. Love, G. L. Steinle and others, with a capital stock of $100,000. The company will manufacture machinery.

BROOKLYN, N. Y.—The Doehler Die Casting Co., Huntington street, has awarded the general contract to M. J. Moran, 198 Patchem avenue, for the construction of a plant addition.

BROOKLYN, N. Y.—The Improved Appliance Co. has filed plans for a $10,000 plant addition. W. B. Wills, 1181 Myrtle avenue, is architect.

BROOKLYN, N. Y.—Plans for a $45,000 factory building for Cornelius Weiss, 258 Front street, are being revised. The proposed structure, according to new plans will be two stories high, 87 x 100 feet.

BROOKLYN, N. Y.—A $15,000 factory addition will be erected at the plant of Isaac H. Cary, 200 Fulton street.

BUFFALO.—The Donner Steel Co., 475 Abbott road, plans the erection of a 1-story brick blowing mill and locker room, at a cost of $5380.

BUFFALO.—The Acme Steel & Malleable Iron Works, Inc., 245 Milford road, is taking bids on a 1-story addition, 100 x 175 feet.

BUFFALO.—M. J. McNiven, this city, has had plans prepared for a 1-story machine shop at Niagara street and Burd avenue.

BUFFALO. — The Buffalo Wash Tray Works, 579 Tonawanda street, will build a plant here soon.

BUFFALO.—The L. C. Ritter estate has had plans prepared for a 1-story forge shop, 21 x 100 feet, at 815 Seneca street.

BUFFALO. — The Standard Art Mirror Co., this city, will build a 2-story factory, 84 x 119 feet.

DUNKIRK, N. Y.—Plans are being drawn for a 1-story, 85 x 120-foot plant addition for the American Locomotive Co.

DUNKIRK, N. Y.—The United States Radiator Co., this city, will build an addition to its plant.

LITTLE VALLEY, N. Y.—G. F. Miller & Son, Salamanca, N. Y., are understood to have received the general contract for expanding the plant of the Cattaraugus Cutlery Co. Three buildings will be erected at a total cost of $60,000.

LITTLE FALLS, N. Y.—The Catarogus Cutler Co., this city, is having plans prepared for a 2-story plant, 60 x 100 feet, to cost $60,000.

LONG ISLAND CITY, L. I., N. Y.—Plans are being drawn for a $35,000 foundry for the John Polachek Bronze Iron Co., 480 Hancock street. R. Holestein, at the same address, is architect.

LYONS, N. Y.—The Columbia Concrete Barge Co., 60 Broadway, New York, contemplates the erection of a shipbuilding plant in this city.

NEW YORK.—The Chelsea Storage Warehouse, 426 West Twenty-sixth street, is having plans revised for a $70,000 addition. Architects Wortman and Braun, 114 East Twenty-eighth street, are drawing plans which now call for a 7-story structure, 25 x 100 feet.

Business Changes

THE Woodruff Coal & Iron Co., Pittsburgh, recently moved into larger quarters in the Oliver building, that city. It has taken over the business of the Fobewood Coal & Iron Co. W. W. Woodruff is president. The company handles coal, pig iron, coke, castings and various steel products.

V. Baudin, engineer, has removed his office to 21 East Fortieth street, New York.

The Mahr Manufacturing Co., Minneapolis, Minn., has removed its Chicago office to 812 Hearst building.

The Grip Nut Co. has moved its offices from the McCormick building to the Railway Exchange building, Chicago.

Pilling & Crane, Philadelphia, have moved their New York office from the third to the thirteenth floor, 71 Broadway.

The Clarage Fan Co., Kalamazoo, Mich., has removed its Chicago office to the Conway building, 111 West Washington street. Gardner I. Thomas is manager.

NEW YORK.—The Oceanic Engineering stock of $100,000 to manufacture diving apparatus and raise sunken ships.

NIAGARA FALLS, N. Y.—The National Carbon Co., Cleveland, will erect two factory buildings at its plant in this city, at an aggregate cost of $27,000. One structure will Co. has been incorporated with a capital be four stories high, 50 x 60 feet, while the other will be one story high, 48 x 88 feet. Brass Bros. will be in charge of the construction.

SHOOTERS ISLAND, N. Y.—The Standard Shipbuilding Co. is drawing plans for a 1-story, 60 x 400-foot boiler shop.

SYRACUSE, N. Y.—Work on the erection of a $15,000 warehouse addition for the Harvest Milling Co. has been temporarily postponed.

UTICA, N. Y.—A $30,000 factory addition will be erected by the Bossert Co. The proposed building will be two stories high, 63 x 116 feet. Charles Kiehn is architect.

WATERTOWN, N. Y.—The sulphite mill of the International Paper Co. was badly damaged by fire. The loss is estimated at $100,000.

WATERVILLE, N. Y.—While the erection of an electric plant is being contemplated by the Waterville Gas & Electric Co., Syracuse, New York, the architect has not yet been selected.

EDGELY, PA.—Bids are being received by Architect Harry A. Hill, Trenton, N. J., on a $20,000 plant for the Chain Products Co. The plant will be one story high, 40 x 104 and 40 x 80 feet.

HAZELTON, PA.—Engineer G. T. Hand, 143 Liberty street, New York, will build a plant here for the Lehigh Valley railroad to repair engines.

HAZELTON, PA. — MacCue and Moran, this city, will build a bottling plant on West Broad street at once.

HAZELTON, PA. — The Lehigh Valley railroad has decided to build shops and round houses at Ashmore, Pa., at a cost of $1,200,000.

INDIANA, PA.—A $500,000 mill and general factory building will be erected by the Consolidated Lumber & Supply Co.

LOCK HAVEN, PA.—This city proposes to spend $100,000 for improving its water supply. H. P. Shoemaker is city engineer.

MANHEIM, PA.—The Hershey Foundry Machine Co. has temporarily postponed work on a $30,000 foundry and pattern shop.

MEADVILLE, PA.—E. Z. Van Raalte is manager of the Buffalo branch of the Niagara Silk mills, which will build an addition to its plant here.

MIDDLETON, PA. — The Middletown & Swatara Consolidated Water Co. will build a reservoir here in the near future.

PHILADELPHIA.—Separate bids are being received on the construction of a $15,000 factory by William C. Gruhler.

PITTSBURGH. — The Pittsburgh Iron Folding Bed Co. has purchased land on Pike street here and plans the erection of a building to cost $110,000.

POTTSVILLE, PA.—The Pottsville Iron & Steel Co. has plans prepared for a 1-story foundry 99 x 120 feet.

BLOOMFIELD, N. J. — American Spark Plug Co. has been incorporated with $125,000 capital to manufacture spark plugs. J. S. Fauth, S. R. Kerlin, of Bloomfield, and Robert MacDonald, of East Orange, are the incorporators.

CAMDEN, N. J.—Camden Forge Co. will erect "victory shop," 75 x 480 feet in size,

100

ROLLING MILLS

Of Our Design and Manufacture

79 in the United States of America

5 in Canada	1 in France
5 in England	1 in Belgium
4 in Germany	1 in Austria
3 in India	1 in Australia

AS CONSULTING ENGINEERS

we prepare estimates and make drawings for contemplated rolling mills. Our services include electrical engineering.

AS MANUFACTURING ENGINEERS

we enter into contracts for complete rolling mills, producer-gas machines, and wire drawing equipment.

MORGAN CONTINUOUS ROLLING MILLS—
STANDARD OF THE WORLD

MORGAN CONSTRUCTION CO.

Worcester, Mass., U.S.A.

Say you saw it in THE IRON TRADE REVIEW

of brick and metal, and an addition, 31 x 160 feet in size.

HOBOKEN, N. J.—Hudson Pump Co. has been incorporated with $10,000 to manufacture pumps, by John J. Marnell, Francis T. Morgan and Alma B. Borrack, Hoboken.

JERSEY CITY, N. J.—New Jersey Car Spring & Rubber Co. has been incorporated with $1,000,000 capital by W. M. Pepper, New York; G. W. Henne, Mansfield, O.; and G. W. Stephens, Chicago.

MAYS LANDING, N. J.—Bethlehem Loading Co. contemplates the erection of big power plant near South river.

NEWARK, N. J.—The Butterworth-Judson Corp., 421 Roanoke avenue, will erect a 2-story frame and tile factory, 20 x 134 feet, and four 1-story frame storage buildings, 10 x 11 feet, at a cost of $13,400.

NEWARK, N. J.—Work will be started soon on a plant addition for the Central Stamping Co. The steel contract has been awarded the American Bridge Co.

NEWARK, N. J.—August Fink & Sons will erect a 1-story dock and engine room at a cost of $14,000.

NEWARK, N. J.—The New Process Pipe & Tube Bending Co. has filed a certificate of dissolution with the secretary of state.

OGDENSBURG, N. J.—The New Jersey Zinc Co., 55 Wall street, New York, contemplates rebuilding its power house in this city at a cost of $15,000.

PLAINFIELD, N. J.—Accurate Engineering Co. has been incorporated with $35,000 capital to manufacture tools, etc. The incorporators are C. P. Crouch, Anton Johnson and G. W. V. Moy, all of Plainfield.

RIVERSIDE, N. J.—It is reported that the Pennsylvania railroad will erect new car and repair shops near here.

TRENTON, N. J.—The John E. Thropp Sons Co. have completed preliminary plans for a $50,000 foundry, 1-story high, 100 x 350 feet, and a 1-story power plant.

FORT PENN, DEL.—The Marlin Rockwell Leading Co., care of the Marlin Rockwell Arms Corp., 14 Wall street, New York, contemplates the erection of a plant in this city.

CUMBERLAND, MD.—Plans for a $1,000,000 manufacturing plant, to be erected for the Kelly Springfield Tire Co. in this city have been completed by Architect Edward Nercersukmer, 507 Fifth avenue, New York.

RICHMOND, VA. — The Mineral Ridge Manganese Corp. contemplates the immediate erection of an iron furnace of 100 tons daily capacity.

Activities in the Central States

FOND DU LAC, WIS.—Because of a large increase in business the Curtis Tool Co. has moved into larger quarters at Macy and West Second streets. It is probable the company may buy several machines.

GREEN BAY, WIS.—W. P. Wagner will build a 1-story machine shop addition, 38 x 45 feet, to his garage at 1030 Monroe avenue.

MANITOWOC, WIS.—The capital stock of the Stangel Hardware Co. has been increased from $50,000 to $125,000. The concern has just completed a new warehouse, office and store building at Eighth and Quay streets at a cost of $40,000.

MILWAUKEE, WIS.—The Milwaukee Die Casting Co. has awarded contracts for the erection of a $10,000 addition to its plant at 295-297 Fourth street. Architect A. C. Clas is in charge.

MILWAUKEE.—The capital stock of the Magnetic Mfg. Co., 601 Enterprise building, has been increased from $15,000 to $25,000.

MILWAUKEE. — The Pfau Motor Pump Co., 248 Fourth street, is planning a new plant for the manufacture of electrically operated compressed air pumping systems, following its recent incorporation with $30,000 capital stock.

RIB LAKE, WIS.—The Rib Lake Lumber Co. is having plans prepared for a machine shop to take care of all repairs and new construction of machinery and equipment of its big sawmill and planing mill. The investment will be about $20,000.

SHEBOYGAN, WIS. — The Black Cat Hosiery Co., Kenosha, Wis., has awarded a contract to Walter W. Oeflein, 86 Michigan street, Milwaukee, for building a 1-story factory addition, 50 x 150 feet, which will cost about $30,000, with machinery and electric motor equipment.

WATERTOWN, WIS. — The Monarch Tractor Co. will build a machine shop addition, 40 x 150 feet, and an erecting shop and foundry addition, 90 x 100 feet.

WEST ALLIS, WIS.—The Federal Malleable Co., Sixty-fourth avenue, is planning to enlarge its foundry.

WEST ALLIS, WIS.—The Universal Machinery Co., E. C. Devin, president, will build a plant costing $250,000. F. E. Gray, 86 Michigan street, Milwaukee, is architect.

ALMA, MICH.—At the annual meeting of the stockholders of the Ex-Cell-All Co. held here recently, it was decided to build an addition to their plant, 30 x 100 feet.

ANN ARBOR, MICH.—The Forge Products Corp. will build a 1-story machine shop, 52 x 100 feet, and a forge shop, 52 x 80 feet.

DETROIT.—The Commerce Motor Car Co., J. J. Kellogg, secretary, Solvay and Mackie avenues, will build a 1-story factory, 50 x 200 feet. Fred J. Winter, 2331 Dime Bank building, is architect.

DETROIT.—The National Twist Drill & Tool Co. is building a 5-story brick and steel addition.

DETROIT. — The Flower Stephens Mfg. Co., John W. Flower, president, Clayton and Parkinson avenues, will build a foundry addition, 37 x 150 feet, costing $18,000.

DETROIT.—The Detroit Automatic Scale Co. will build a 5-story addition, 113 x 121 feet.

PORT HURON, MICH.—The Great Lakes Foundry Co. has increased its capital to $50,000 and contemplates extensive additions to the plant. The firm recently changed its name from the Theisen-Braithwaite Co., Inc.

SAGINAW, MICH.—The Wolverine Tractor Co., 1895 Ford building, Detroit, will build a 1-story plant 80 x 200 feet.

BLOOMINGTON, ILL. — The city will probably build an incinerating plant, at a cost of from $10,000 to $12,000. A. G. Erickson is in charge.

CAIRO, ILL.—The city is considering the erection of five city terminals for interchange of freight between steam railroads and the Ohio and Mississippi rivers. It is estimated the cost of the structures will total $550,000.

CARLINVILLE, ILL. — Carlinville Home Builders' association plans 300 new houses to be occupied by families of miners attracted by four new mines of the Standard Oil Co. E. A. Ibbetson is president of the association.

CHICAGO.—The Acme Castings Co., capitalized at $10,000, has been chartered by E. H. Levinstein, Joseph B. Brennan and Frank R. Dalton.

CHICAGO. — The Wieboldt Construction Co., Van Buren street and Ashland avenue, will build a 1-story garage 100 x 180 feet, to cost $30,000.

CHICAGO.—The plant of the Diamond T Motor Car Co. is to be enlarged. Approximately 7200 square feet will be added to the company's present plant, requiring an investment of $15,000. An up-to-date tool room is also to be installed.

CHICAGO.—The William Ganschow Co., manufacturer of gears, 1001 Washington street, has bought a site and will build an addition.

CHICAGO.—The Peoples Gas, Light & Coke Co., 122 South Michigan avenue, will build a gas plant in four sections at a cost of $30,000,000. Rudolph Schenck is architect and G. C. Lowell is engineer, both care of the company.

CHICAGO.—The Electric Steel Co., Thirty-first and Wood streets, has let a contract to the E. W. Sprowl Co., 1120 West Thirty-fifth street, for a 1-story foundry addition, 130 x 300 feet, to cost $75,000. S. Scott Joy, 1118 West Thirty-fifth street, is architect.

CHICAGO HEIGHTS, ILL.—The Indiana Car Works has bought the plant of the Hick Car Works and will build additions.

DE PUE, ILL.—Fire has destroyed the east unit of the ore crusher plant of the Mineral Point Zinc Co.

EAST ST. LOUIS, ILL.—The Excelsior Tool & Machine Co., Thirty-first and Ridge streets, will build a 1-story addition, 50 x 166 feet, to cost $12,000.

EAST ST. LOUIS, ILL.—The Erber & Cohn Co. will erect a new fireproof theater here, to seat 2232 persons. It is estimated the building will be erected at a cost of $225,000.

EAST ST. LOUIS, ILL.—Outside capital, aided by local subscriptions, plans an 11-story hotel with 330 rooms and a convention hall. Address Fred W. Mollman, mayor.

FOX LAKE, ILL.—Bids are being taken until May 22 by the village of Fox Lake for the construction of several bridges and culverts.

BOONVILLE, IND.—Plans are being prepared for the construction of a number of bridges in the various townships of the county, and the county auditor will advertise for bids within the next 30 days.

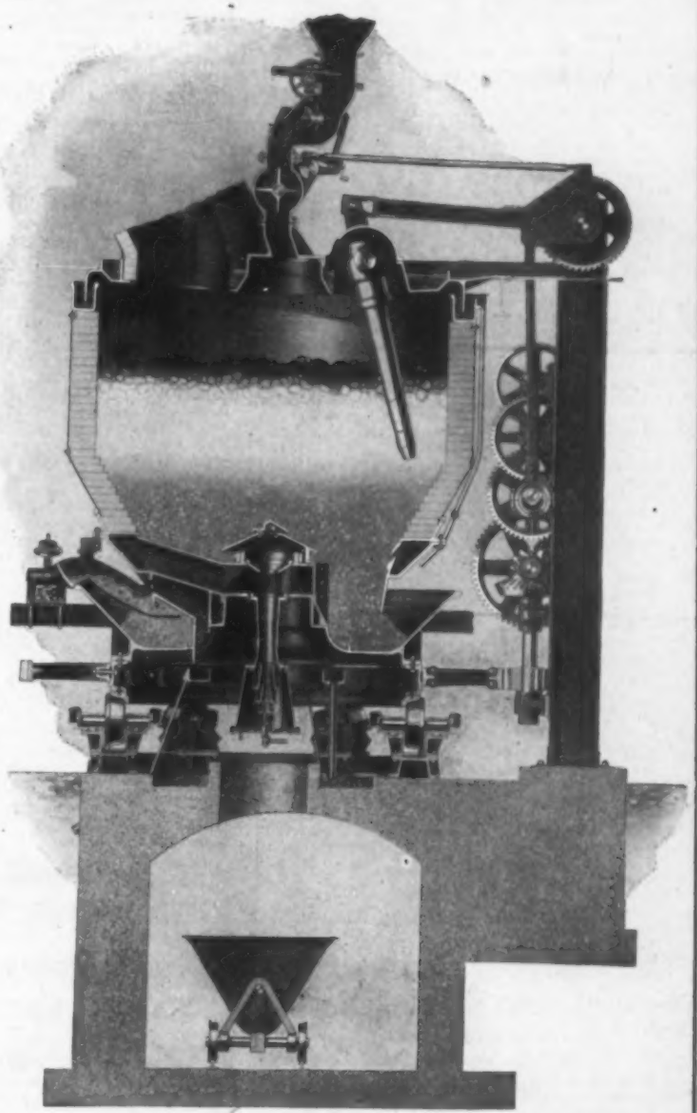
The Hughes Mechanical Gas Producer

REPEAT ORDERS
Indicate Satisfaction

A partial list of repeat customers showing number of Hughes Producers used by each.

Carnegie Steel Co.	119
American Steel & Wire Co.	56
Bethlehem Steel Co.	54
New Jersey Zinc Co.	42
National Tube Co.	41
Jones & Laughlin Steel Co.	40
Lackawanna Steel Co.	39
Indiana Steel Co.	38
Inland Steel Co.	36
Minnesota Steel Co.	36
Pittsburgh Steel Co.	36
American Sheet & Tin Plate Co.	32
Republic Iron and Steel Co.	32
American Rolling Mill Co.	30
Corrigan, McKinney & Co.	30

More than 1000 in use



Write for Bulletin A-4

Bulletin A-4 contains considerable information on the subject of producer gas and explains the Hughes Uniform Feed, Water Cooled Poker, Blowing, Mixing and other special features which contribute to its splendid performance. A copy is waiting your request.

THE WELLMAN-SEAVER-MORGAN CO.

CLEVELAND, OHIO, U. S. A.

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports

Old range Bessemer, 55 iron	$5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

WAREHOUSE PRICES

Steel bars, Chicago	4.10c
Steel bars, Cleveland	4.035c
Steel bars, Detroit	4.085c
Steel bars, Philadelphia	4.10c
Steel bars, New York	4.095c
Steel bars, St. Louis	4.17c
Steel bars, Cincinnati	4.085c
Steel bars, St. Paul	4.22c
Steel bars, Buffalo	4.05c
Iron bars, Buffalo	4.65c
Iron bars, Chicago	4.10c
Iron bars, Cleveland	3.985c
Iron bars, Detroit	4.75c
Iron bars, St. Louis	4.17c
Iron bars, Cincinnati	4.085c
Iron bars, Philadelphia	4.50c
Iron bars, New York	4.659c
Shapes, Chicago	4.20c
Shapes, Detroit	4.185c
Shapes, St. Louis	4.27c
Shapes, St. Paul	4.32c
Shapes, New York	4.195c
Shapes, Cleveland	4.135c
Shapes, Philadelphia	4.20c
Shapes, Buffalo	4.15c
Shapes, Cincinnati	4.185c
Plates, Buffalo	4.40c
Plates, Chicago	4.45c
Plates, Detroit	4.435c
Plates, St. Louis	4.52c
Plates, St. Paul	4.57c
Plates, New York	4.445c
Plates, Cleveland	4.385c
Plates, Philadelphia	4.45c
Plates, Cincinnati	4.435c
No. 10 blue anl. sheets, Chi.	5.45c
No. 10 blue anl. sheets, C'eve.	5.385c
No. 10 blue anl., Buffalo	5.40c
No. 10 blue anl., sheets, St. L.	5.52c
No. 10 blue anl. sheets, Cinci.	5.435c
No. 10 blue anl. sheets, St. Paul	5.57c
No. 10 blue anl. sh., Detroit	5.435c
No. 28 black sheets, Chgo.	6.45c
No. 28 black sheets, Cleve.	6.385c
No. 28 black sheets, Cinci.	5.45c
No. 28 black, Detroit	6.435c
No. 28 black sheets, St. L.	6.52c
No. 28 black sheets, St. Paul	6.57c
No. 28 galv. sheets, Chgo.	7.70c
No. 28 galv. sheets, Cleve.	7.635c
No. 28 galv. sheets, Cinci.	6.635c
No. 28 galvanized, Detroit	7.685c
No. 28 galv. sheets, St. L.	7.77c
Hoops, Cleveland	4.885c
Hoops, Detroit	4.935c

IRON AND STEEL SCRAP

(Prices in Gross Tons)

STEEL WORKS USE

Bundled sheets, Cincinnati	$22.50 to 23.00
Bundled sheets, Pittsburgh	22.00
Bundled sheets, Cleveland	23.50 to 24.25
Bundled sheets, Buffalo	24.00 to 25.00
Boiler plate, cut, No. 1, Chg.	24.50 to 25.50
Boiler plate, cut No. 1, St. L.	25.50 to 26.00
Frogs, switches, guards, St. L.	28.50 to 29.00
Frogs, switches, guards, Chgo.	29.00
Heavy melting steel, Pitts.	29.00
Heavy melting steel, Buffalo	30.00
Heavy melting steel, Chgo.	29.00
Heavy melt'g steel, Cleveland	29.00
Heavy melting steel, Cinci.	27.50 to 28.00
Heavy melt'g steel, east. Pa.	28.00 to 29.00
Heavy melting steel, N. Y.	26.75
Heavy melting steel, St. L.	27.50 to 28.00
Heavy melt'g steel, Birming.	22.50 to 24.00
Hydraulic press. sheets, Cleve.	28.50 to 29.00
Hydraulic press. sheets, Pitts.	26.00
Hydraulic press. sheets, Chgo.	26.00 to 26.50
Knuckles, couplers, Chgo.	34.00
Knuckles, coup., St. Louis	32.50 to 33.00
Low phos. steel, Buffalo	37.50
Low phos. steel, Pittsburgh	39.00
Low phos. crops eastern Pa.	39.00
Low phos. quar. & east. Pa.	36.50
Shoveling steel, Chicago	28.00 to 28.50
Shoveling steel, St. Louis	26.50 to 27.00
Springs, Chgo.	34.00
Steel rails, short, Chicago	34.00
Steel rails, short, Cleveland	34.00
Steel rails, short, St. Louis	30.75 to 31.25
Steel rails, old, Birmingham	24.00 to 25.00
Stove plate, Chgo.	25.50 to 26.50
Stove plate, Cincinnati	20.00 to 20.50
Stove plate, St. Louis	22.50 to 23.00
Stove plate, N. J. points	24.75
Stove plate, Birmingham	20.00 to 22.00
Stove plate, Buffalo	24.00 to 25.00
Stove plate, eastern Pa.	24.00 to 25.00
Stove plate, Cleveland	25.00 to 25.50
Stove plate, Pittsburgh	22.00
Bundled sheets, Cincinnati	20.00 to 20.50

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:	
Cleveland	$1.10
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	1.10
St. Louis	3.70
Minneapolis, St. Paul	4.54
Buffalo to:	
Albany, N. Y.	$1.26
New England (rail)	3.10
New York and Brooklyn (rail)	3.10
Virginia furnaces to:	
Philadelphia	$3.27
New England	3.77
Brooklyn, Jersey City, Newark	3.52
Birmingham, Ala., to:	
Boston	6.00
Cincinnati	2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	6.00
Philadelphia (r. and w.)	5.25
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40
Chicago to:	
Des Moines	$2.80
Minneapolis, St. Paul	2.00
Milwaukee	.50
Moline, Ill.	1.15
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:	
Chicago	$3.00
Cincinnati	1.40
Cleveland	1.90
Detroit	2.10
Indianapolis	1.80
Minneapolis, St. Paul	4.54
Duluth, Minn., to:	
Minneapolis, St. Paul	$1.25
Mayville, Wis.:	
Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:	
New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	17.0 cents
Baltimore	18.0 cents
Cleveland	13.5 cents
Cincinnati	18.5 cents
Chicago	21.5 cents
Detroit	18.5 cents
Minneapolis and St. Paul	32.9 cents
Denver	82.5 cents
St. Louis	27.0 cents
New Orleans	30.7 cents
Birmingham	45.0 cents
Pacific coast (all rail)	$1.00
Pacific coast (tin plate)	1.00

IRON MILL USE

Angle bars, iron, Chgo.	39.00
Angle bars, steel, St. Louis	30.50 to 30.50
Angle splice bars, St. Louis (iron)	37.50 to 38.00
Arch bars, transoms, Chgo.	46.50
Arch bars and transoms, St. Louis	45.00 to 45.50
Busheling, No. 1, Cleveland	29.00 to 30.00
Busheling, No. 1, Buffalo	29.00 to 30.00
Busheling, No. 2, Buffalo	21.00 to 23.00
Busheling, No. 1, Pittsburgh	32.00
Busheling, No. 1, Cincinnati	25.00 to 25.50
Busheling, No. 1 Chgo.	29.00 to 29.50
Busheling, No. 2, Chgo.	19.25 to 20.25
Busheling, No. 1, St. Louis	26.00 to 27.50
Cast borings, New York	16.50 to 17.00
Cast borings, eastern Pa.	19.00
Cast borings, Buffalo	18.00 to 19.00
Cast borings, Cleveland	18.00
Cast borings, Cincinnati	15.50 to 16.00
Cast borings, Pittsburgh	19.00
Cast borings, Birmingham	12.00 to 12.50
Cast borings, Chgo.	17.50 to 18.00
Cast borings, St. Louis	16.50 to 17.00
City wrought, long, N. Y.	31.00
Car axles, Chgo.	31.00 to 31.50
Forge flashings, small, Cleve.	27.00 to 27.50
Forge flashings, large, Cleve.	27.00 to 27.50
Forge No. 1, eastern Pa.	26.50 to 27.50
Grate bars, Buffalo	24.50 to 25.00
Grate bars, Cleveland	25.50 to 26.00
Grate bars, N. J. points	24.75
Iron axles, Pittsburgh	46.50
Iron axles, Cincinnati	43.00 to 43.50
Iron axles, Cleveland	46.50
Iron axles, Chicago	46.50
Iron axles, eastern Pa.	46.50
Iron axles, St. Louis	46.00 to 46.50
Iron axles, Buffalo	45.00 to 47.00
Iron rails, Chicago	39.00
Iron rails, Buffalo	36.00 to 37.00
Iron rails, Cincinnati	35.00 to 35.00
Iron rails, St. Louis	36.00 to 36.50
Iron rails, Cleveland	34.00
Machine turnings, Cincinnati	16.00 to 16.50
Machine turnings, Cleve.	18.00 to 18.25
Machine turnings, Buffalo	17.00 to 17.50
Machine turnings, N. Y.	16.00 to 16.50
Machine turnings, Pitts.	18.00 to 19.00
Machine turnings, east. Pa.	18.50 to 19.00
Machine turnings, Birming.	17.00 to 17.50
Machine turnings, Chicago	17.50 to 18.00
Machine shop turnings, St. L.	17.50 to 18.00
Pipes and flues, Cleveland	24.50 to 25.50
Pipes and flues, Chicago	26.50 to 27.00
Pipes and flues, St. Louis	26.25 to 26.75
R. R. mch. cast, No. 1, Buff.	34.00
R. R. wrgt. No. 1, Buffalo	34.00
R. R. wrgt., No. 1, east Pa.	34.00
Railroad wrgt. No. 1 Cinci.	33.50 to 34.00
Railroad wrgt., No. 1, Cleve.	34.00
R. R. wrought, No. 1, Pitts.	34.00
Railroad wr'ght, No. 2, Chgo.	31.00 to 31.50
Railroad wr'ght, No. 1, Chgo.	33.50 to 34.00
R. R. wrgt. No. 1, Birming.	25.00 to 27.00
No. 1 yard wrought East Pa.	33.00
No. 1 busheling wrgt., E. Pa.	31.00
Steel wrought, Pittsburgh	34.00
Railroad wrgt., No. 1, St. L.	33.00 to 35.50
Railroad wrgt., No. 2	31.25 to 31.75
Wrought pipe, Buffalo	27.00 to 28.00
Wrought pipe, eastern Pa.	31.50 to 32.00
Wrought pipe, ungraded, eastern Pa.	29.00

IRON OR STEEL WORKS USE

Axle turnings, Cleveland	$24.00
Axle turnings, Buffalo	24.00
Heavy axle turn'gs, E. Pa.	24.00
Heavy axle turnings, Pitts.	25.00
Shafting, New York	35.50
Shafting, eastern Pa.	39.00
Steel car axles, Pittsburgh	46.50
Steel car axles, Birmingham	30.00 to 32.00
Steel car axles, New York	43.00
Steel car axles, Buffalo	44.00 to 46.00
Steel car axles, Cleveland	44.00
Steel car axles, eastern Pa.	46.50
Steel car axles, Chgo.	46.50
Shafting, St. Louis	36.50 to 37.00
Steel car axles, St. Louis	46.00 to 46.50

IRON FOUNDRY USE

Car wheels, (iron), Pitts.	$29.00
Car wheels, (steel), Pitts.	34.00 to 35.00
Car wheels, eastern Pa.	29.00
Car wheels, Buffalo	29.00
Car wheels, Chicago	29.00
Car wheels, St. Louis	28.50 to 29.00
Car wheels, Birmingham	25.00 to 27.00
Car wheels, Cleveland	30.00
Tram car wheels, Birming.	21.50 to 24.00
Cast, No. 1, cupola east. Pa.	33.00
Cast, No. 1, Birmingham	23.00 to 25.00
Cast, No. 1, Cleveland	31.50
Cast, No. 1, Cincinnati	31.00 to 31.50
Cast, 1, heavy, N. J. points	32.25 to 32.75
Cast, 1, machy., N. J. points	32.50 to 32.75
Cast, No. 1, Chicago	30.50 to 31.00
Cast, No. 1, Pittsburgh	32.50 to 33.00
Cast, No. 1, St. Louis	26.50 to 29.00
Malleable, Cincinnati	30.00 to 34.00
Malleable, Cleveland	30.00 to 34.00
Malleable, Buffalo	29.00 to 34.00
Malleable, Pittsburgh	33.00 to 34.00
Malleable, east. Pa.	29.00
Malleable, cupola, East Pa.	33.00
Maleable railroad, Chgo.	32.00 to 33.00
Malleable, agricultural, Chgo.	31.00 to 31.50
Malleable railroad, St. Louis	28.50 to 29.00
Malleable agricultural, St. L.	27.25 to 27.75

MISCELLANEOUS USES

Boiler punchings, Chgo.	36.00 to 36.50
Reroll. rails, 5 ft. & ov., Pitts.	34.00
Reroll. rails, 5 ft. & ov., Chgo.	34.00
Reroll. rails, 5 ft. & ov., E. Pa.	34.00
Reroll. rails, 5 ft. & ov., St. L.	33.50 to 34.00
Reroll. rails, 5 ft. or over, Cleve.	34.00
Rerolling rails, long, Birm.	37.50 to 38.50
Locomotive tires, Chgo.	41.00 to 41.50
Locomotive tires, St. Louis	40.50 to 41.00